THE MONTHLY

Review

CONVENTION AND EXPOSITION ISSUE

JUNE • • • 1947

The New CLEPO SPEE-D-BURR * PROCESS

FOR • FAST DEBURRING
• RADIUS BLENDING
• SURFACE SMOOTHNESS
• REMOVAL OF DRAW MARKS AND SCRATCHES
ON • ZINC-BASE DIE CASTINGS
ALUMINUM • BRASS • STEEL

* PAT. PENDING

For barrel finishing of small parts. Removes burrs in half the time that other tumbling methods require and leaves a smooth surface free of dents, nicks and orange-peel effect. After the deburring operation the parts can be buffed to a smooth high lustre without other wheel operations or can be barrel burnished to a high smooth gloss. If you are troubled with rough surfaces after your deburring operation or cannot get the desired lustre on your finished work why not investigate this new development in barrel tumbling?

FREDERICK **GUMM** *Chemical Company Inc.*

538 FOREST STREET, KEARNY, N. J.

DETROIT

JUNE 23 TO 27 INCLUSIVE

Industrial Finishing Exposition

AND

34TH ANNUAL CONVENTION

AMERICAN ELECTROPLATERS' SOCIETY

A. E. S. MEMBERS
PLANT EXECUTIVES
ENGINEERS · TECHNICIANS

This Exposition, the greatest of its kind ever held, is designed to acquaint the executive who ordinarily does not attend American Electroplaters' Society Conventions, with the latest developments in finishing equipment and the techniques of various processes.

Many of the exhibits will be in operation, thus affording an opportunity to actually see the forward strides this $300,000,000 industry has made in the past few years.

You will meet the men who are responsible for those new developments . . . to talk with them and obtain valuable information on new and up-to-date Equipment. Don't fail to attend this mammoth Exposition. You will find that it will pay worth-while dividends in knowledge gained and prove to be time well spent.

FOR INFORMATION WRITE

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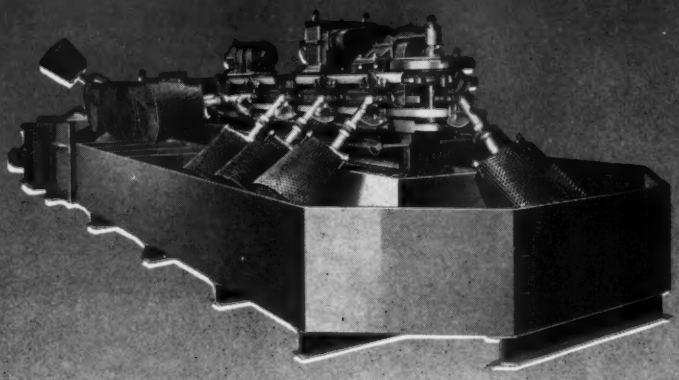
WELCOME A. E. S.



DETROIT · 1947

STEVENS "STANDARD" SMALL PARTS PLATING MACHINE

This machine, which will be exhibited at our booths (Numbers 31 to 37 and 52 to 58) at the June Exposition of the American Electroplaters' Society, is a standard, complete Full Automatic Small Parts or Barrel Plating Unit, built to meet the popular demand for a medium sized automatic installation.

Cleaning, acid treatment, rinses, plating, drying and automatic unloading operations are all incorporated in this machine.

Can be used for cadmium, zinc, copper, nickel or tin plating of small parts. Wide variations in the plating cycle can be had instantly by means of fully developed method of control.

Requires the services of one operator only to load the machine.

No overhead construction. Overhead hoists and duck boards eliminated, low operating and maintenance cost.

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THE MONTHLY

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Entered as second class matter July 1, 1946, at the post office at Philadelphia, Pa., under Act of August 24, 1912.

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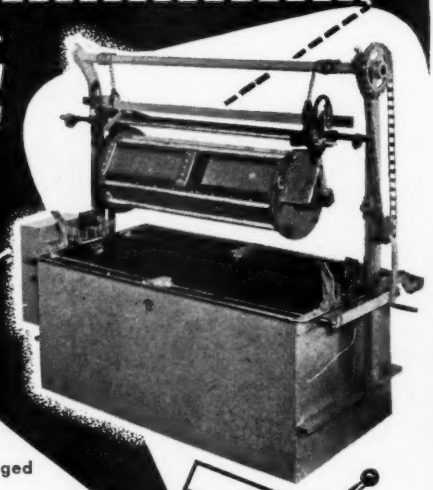

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★ Easily, quickly cleaned negative connection, separated from hanger arms, brought direct to work through hollow hub.

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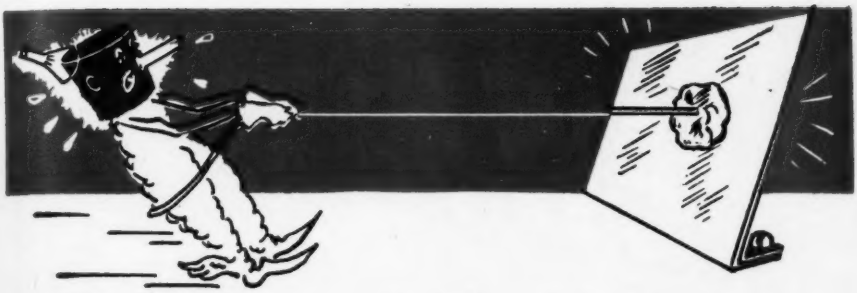

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Monthly Review June

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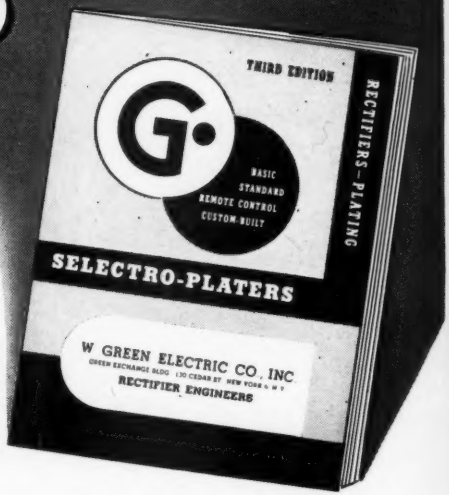

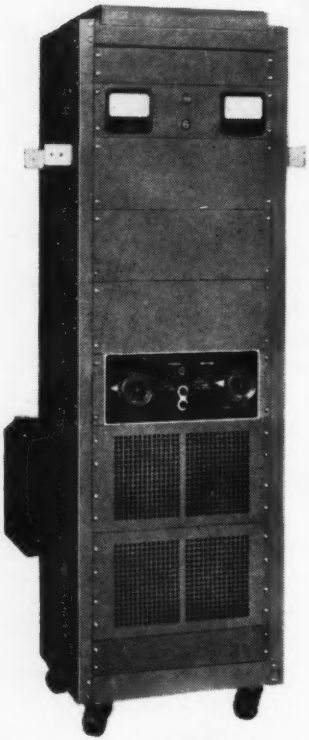

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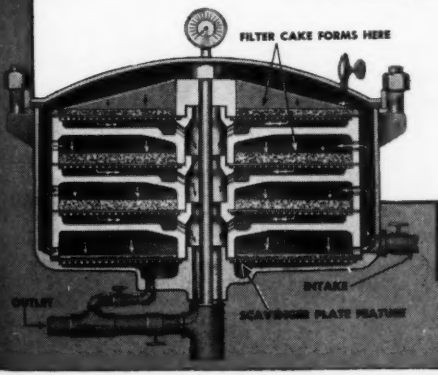

Made in Capacities
60 to 10,000 G.P.H.

See your supplier or Write for details

Our Engineering Service is available for any specialized problems.

NEW

Electropolishing solution for brightening stainless steel

by Du Pont

OUTSTANDING ADVANTAGES:

1. **PRE-MIXED**—ready for immediate use; con-

7. **NON-TOXIC**—no harmful fumes, no noxious odor.

by Du Pont

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1. **PRE-MIXED**—ready for immediate use; contains correct proportion of ingredients for most effective performance.
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Extensive tests in both large and small installations prove that this new and better Electropolishing Solution has many unusual and outstanding advantages. Developed for the polishing of chromium-nickel types of stainless steel, it may be used on chromium alloys as well.

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. . . so you get **SAFETY** as well as **SAVINGS!**

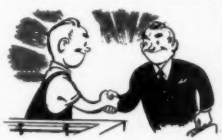
LARGE STOCKS OF CYANIDES, even when you can get them, are always a plant hazard—require the utmost care in both storage and use. With non-cyanide Unichrome Copper, you cut down the quantity of cyanide needed in your plant and also get a safe plating bath.

And, this is just one of *five* outstanding advantages you get in mildly alkaline Unichrome Copper. That's why we say: compare it with any other process, and we believe you'll specify Unichrome Copper every time! Write your nearest Unichrome office today for our helpful technical bulletin.

BUFFING TIME IS CUT—often eliminated entirely—because Unichrome Copper gives you a *smoother* deposit. And because it's a *fast* process, you save time in the tank as well. Only when you save *both* ways do you really lower plating costs.

FEWER ANODES required, because the bath keeps them free of oxides even at high current densities. Why tie up extra money when Unichrome Copper has 100% anode efficiency—with 50% to 75% fewer anodes?

CLEAN DEPOSITS never need activation. With no brighteners, no wetting agents used, Unichrome deposits come out clean, ready for the nickel cycle without special treatment.



HELPFUL SERVICE—Unichrome Copper is simple to maintain, seldom gives trouble. But should the need arise, you can always count on prompt help from our engineers and analytical laboratories.

Be sure to see the United Chromium display at the Detroit Industrial Finishing Exposition, June 23 to 27. Booths 101, 102, 103.

UNICHROME

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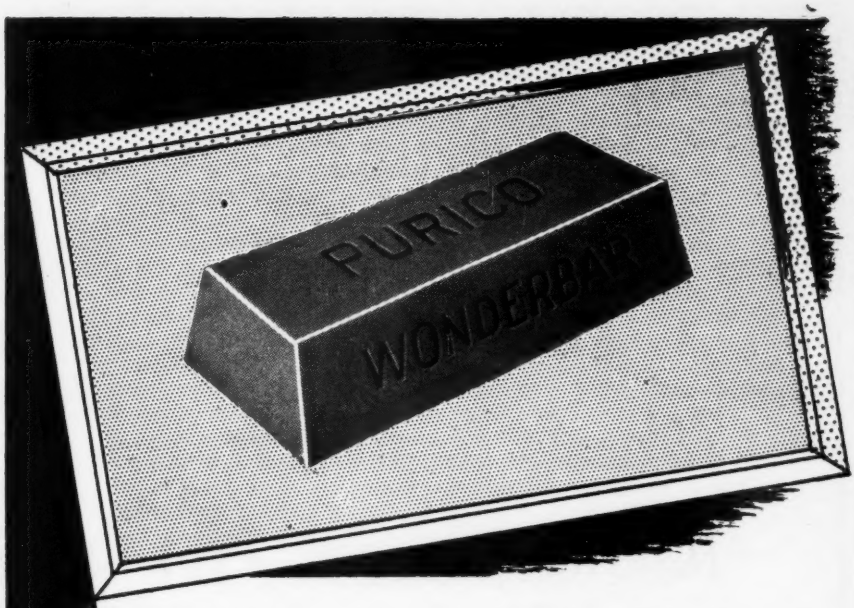

HERE'S THE PICTURE

Today, the wheels of industry are geared to peace time production . . . competition is keener. Aware of this, the Metal Finishing Industry demands a buffing compound that assures not only the bright surface required for perfect plating but one that saves time . . . reduces labor costs . . . speeds up production.

Purico WONDERBAR satisfies these requirements! *It's a pre-saponified Tripoli bar composition for efficient and economical buffing of metal parts. It lasts longer on the wheel . . . does not tarnish work . . . speeds up production by eliminating extra manual scrubbing.* Soluble in mild alkali, WONDERBAR rinses quickly from intricate patterns and eliminates expensive degreasing machines.

Start with a Good Finish

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ZAPON

Wants to See You

AT

Booths Nos. 210 and 211

Yes, you'll find the "welcome mat" out in cordial invitation to you, to visit our Booths Nos. 210 and 211 at the Industrial Finishing Exposition in Detroit on June 23-27!

Discuss today's finish problems with the Zapon Representatives who will be in attendance at the booths. Be prepared to ask about Metal Finishes, Duranites, Metalites, Hammered and Wrinkle Finishes—all based on the latest developments in finish making. And find out about Wood Finishes, Package Coatings for paper, foil, etc., the new Brevons—their many interesting applications.

ATLAS POWDER COMPANY
ZAPON DIVISION

Stamford, Conn. **North Chicago, Ill.**

MAKE A NOTE OF THIS

Your best bet's **FORMAX!**

for **BUFFING WHEELS**
for **POLISHING WHEELS**
for **BUFFING COMPOUNDS**
for **SPRAY-MAX LIQUID BUFFING COMPOUNDS**

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THE FOUR M. ALLEERS

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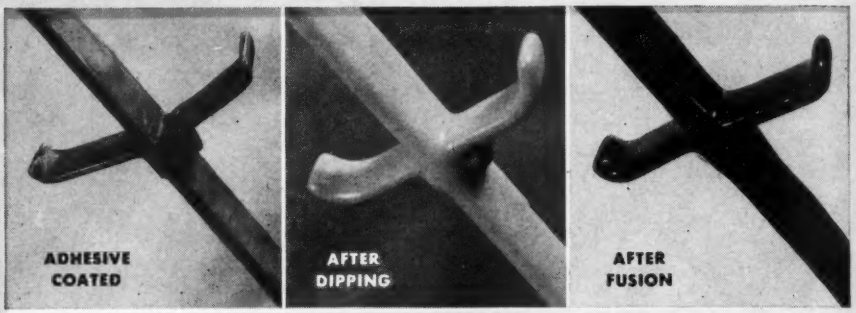
NEW RACK COATING BUILDS ¼" THICKNESS IN A SINGLE DIP



Tygoflex Plastic Handles All Plating Solutions *(including alkaline cleaners)* up to 230° F.

Thickness up to ¼" in a single dip . . . effective resistance to all plating solutions . . . resists salts pick-up . . . upper temperature limits up to 230°F. . . . bonds tightly to steel, copper, brass . . . these are just a few of the properties of Tygoflex, U. S. Stoneware's new liquid plastic protective coating.

Tygoflex (a creamy, viscous, solvent-free liquid plastic) is applied by dipping or brushing. When fused under heat (350°F. for 15 to 30 minutes), Tygoflex converts to a tough, black material resembling in appearance and physical characteristics a glossy live rubber compound of medium hardness. Only one dip is required.

MEETS ALL BASIC REQUIREMENTS

Tygoflex protects racks through all metal finishing operations . . . is unaffected by temperature changes. Tygoflex is unusually tough . . . withstands severe mechanical abuse . . . is easily repaired if damaged. High dielectric strength keeps down current losses. The glossy surface minimizes dragout.

See TYGOFLEX at Booths 278, 279, 300, 301
A. E. S. Exposition, Detroit, June 23-27

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To Protect:

Plating racks
Dipping baskets
Plating tanks
Tank grids
Bus bars
Pickling hooks
Plating barrels
Pipe
Thermometer wells
Fans and housings
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Filters
Drying equipment
Rollers
Tools, control handles

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Pickling
Descaling
Electro cleaning
Electrolytic polishing
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Electrical currents
Mechanical abuse
Anodizing
Bonderizing
Phosphatizing
Dichromatizing
Etching solutions
Alkaline cleaners

U. S. STONEWARE
Akron 9, Ohio

RECTIFIER *Facts*.. Not Fiction

Wagner-Tiedeman Electroplating Rectifiers put other sources of direct current in the horse-and-buggy class. Here are features important to electroplaters who like to keep "an ear to the ground and an eye to the future" . . .

1. FLEXIBILITY

Equipment can be shifted where needed. Eliminates costly guesswork in estimating power demands. • First installation simple and inexpensive. Expand as needed by paralleling into system. • Units quickly replaceable in case of accident. Eliminates wrecking single unit high amperage system. Unit rectifiers easily shifted in emergency.

2. LOW INSTALLATION COSTS

Lower starting loads means smaller feed lines. • Light weight permits hanging or stacking to save floor space. • No expensive foundations required. • Small units may be tucked away in otherwise wasted corners.

3. SIMPLE SERVICING

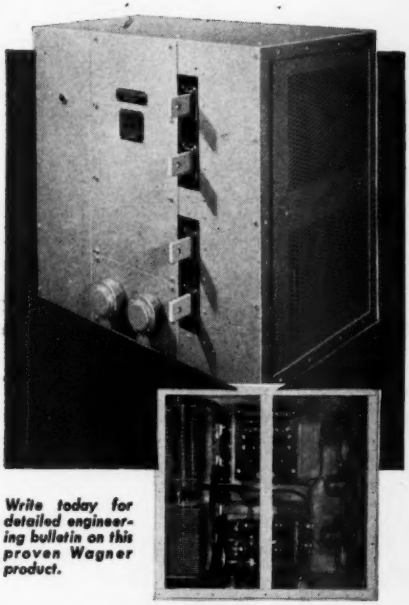
Anyone can service the three major components, fans, transformer and selenium stacks. Stacks fused, everything visible. • Parts and factory service within 24 hours. No plant tie-up for days or weeks for repairs to single unit high amperage system.

4. LOW MAINTENANCE COSTS

Eliminates special service men. • Fans are only moving parts; low velocity, low bearing speeds. • Periodic maintenance (cleaning by compressed air).

5. LOW OPERATING COSTS

Wagner-Tiedeman Rectifier produces low voltage high amperage Direct Current from an Alternating Current source for less money.



Write today for detailed engineering bulletin on this proven Wagner product.

FEATURES

Selenium-on-aluminum cells handle momentary overloads up to 1000% of normal. Effective rectifying area over 4300 square inches. Three 40-watt fans provide ample low-velocity cooling. Transformer, two winding type, reserve capacity. Welded steel enclosure for vertical stacking if higher power is desired.

SPECIFICATIONS

Output, 6 v. at 1500 amp., 12 v. at 750 amp., Input, 220/440 v. 60 cycle 3 ph., power drain approximately 12 Kw. at full load. 34" high, 36" long, 22" wide, floor area 5.5 sq. ft. Weight, approximately 500 lbs. Other voltages and current capacities available.

WE'LL SEE YOU AT THE
INDUSTRIAL FINISHING
EXPOSITION, DETROIT
JUNE, 1947

METAL FINISHING EQUIPMENT

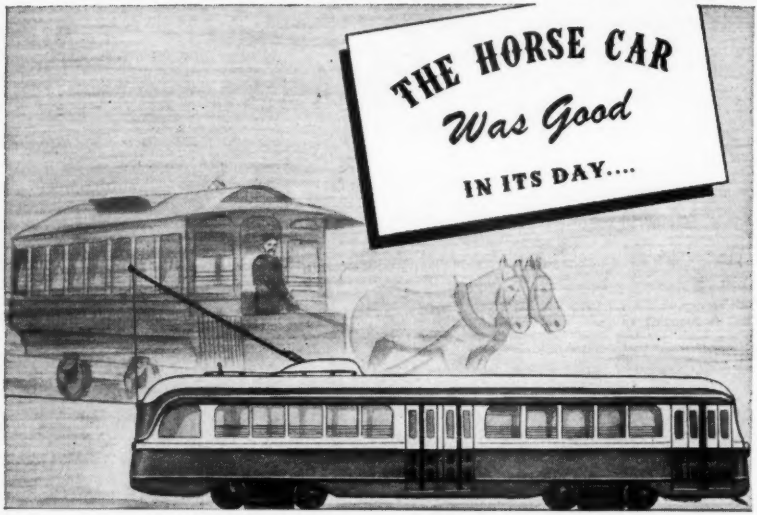
Wagner

BROTHERS INC.

POLISHING AND PLATING MATERIALS

425 Midland Avenue

Detroit 3, Michigan



BUT . . .

It passed from the American scene when metropolitan traffic grew too heavy for its one horse power. Today's streamlined model is an engineering triumph, embodying efficiency, speed and control among its many features.

CHEMICALS
ACP
PROCESSES

RUST PROOFING AND PAINT BONDING

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Duridine *
Alodine *
Lithoform *
Thermoil-Granodine *

RUST REMOVING AND PREVENTING

Deoxidine *
Peroline *

PICKLING ACID INHIBITORS

Rodine *

Duridizing with

*Duridine**

the modern metal conditioner, gives you similar advantages.

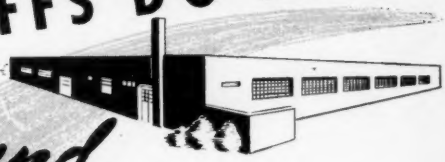
Duridine cleans — removes oil, grease and other surface soil. It also phosphatizes — changes the metallic surface into a non-conductive phosphate film of uniform crystalline structure, a durable bond for organic finishes.

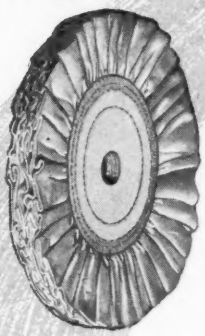
Utilizing power spray washers of mild steel construction, and applied in a simple, fool-proof process, DURIDINE provides outstanding protection for painted sheet metal products.

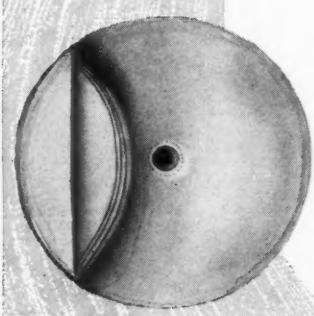
* Trade Mark Reg. U. S. Pat. Off.

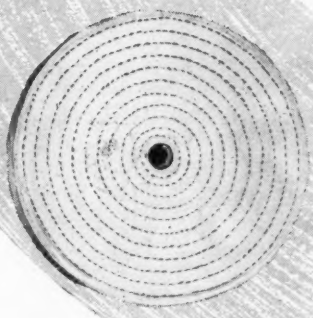
AMERICAN CHEMICAL PAINT CO.
AMBLER ACP **PENNA.**

DULUTH BUFFS DO BEST *all around*









It's no wonder, Duluth Buffs are rapidly becoming noted for "Doing Best All Around."

They are *made* of the finest, selected materials.

They are *made* by experienced, expert craftsmen.

They are *made in* a modern, air conditioned, full daylight plant.

They are *made* to specific requirement for every buffing need.

Write today for free illustrated brochure which gives details on the complete line of Duluth Buffs.

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Check the Outstanding Advantages of

MEAKER

Full Automatic Plating Machines

STRAIGHT-A-WAY RETURN TYPE

1. Economy of Operation

. . . all heavy, tiresome, messy work is done by the machine.

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. . . heavy duty and carefully engineered design insures uninterrupted production schedule.

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Strip Steel **Round Wire**

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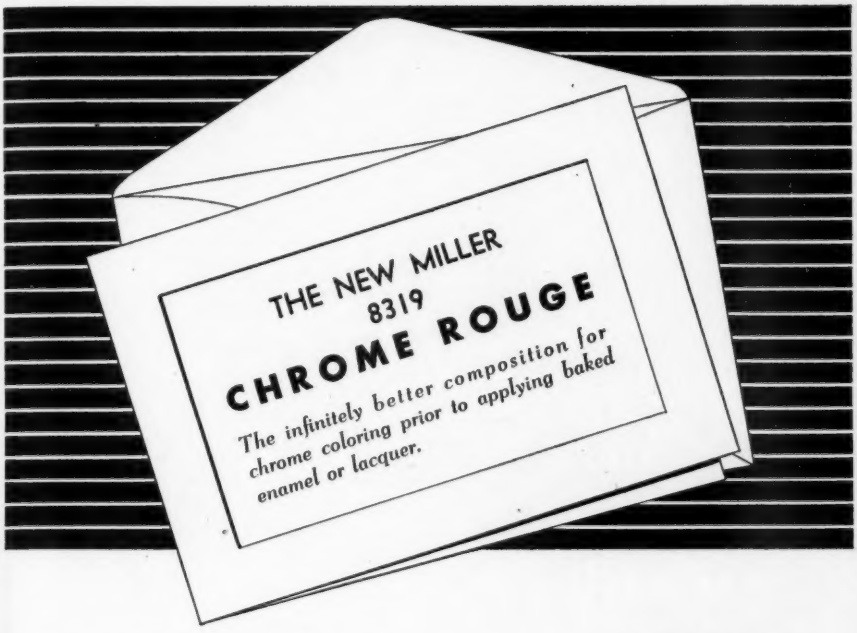
THE NEW MILLER
8319
CHROME ROUGE
The infinitely better composition for chrome coloring prior to applying baked enamel or lacquer.

These Features Incorporated in 8319 Chrome Rouge: fast cut — high color — extreme ease in removal of any burned chrome spots, total elimination of cleaning, racking and unracking — perfect adhesion of baked enamel or lacquer to the buffed chrome surface . . . **Assure You of a Definitely Better Finish Along with Greater Economy and Increased Production.**

EFFECTIVE
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ECONOMICAL
METAL FINISHING

Write for detailed information

J. C. MILLER COMPANY
Manufacturers of Electroplating Equipment and Supplies
GRAND RAPIDS 4, MICHIGAN

"We'll see you at the Industrial Finishing Exposition, Detroit, June 1947"

An Egyptian Finish

BEAUTIFIES AND PROTECTS

Mix Crafter

An Attractive Specialty by Chrom-Craft Division of American Fixture & Manufacturing Co., St. Louis, Mo.

The attractive Mix Crafter is finished with Egyptian's High Bake NFR. Exceptionally fine two-tone color combinations are achieved by normal application of this specialized Egyptian finish.

The right finish is more than mere surface protection . . . so put your regular or special finish requirements up to Egyptian. Inquiries are invited.

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SPECIALIZED PRODUCTION FINISHES

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WE DON'T WANT ANYONE *Up a Tree*

Shinning up a tree and putting yourself out on a limb is no fun! No sir, and we don't aim to see you "up a tree" for Buffs.

In fact, we're all out in every way to bring you all the Buffs you need and want. Cloth and cotton materials, the best available, are rapidly being processed through our modern production procedures and becoming the best Buffs on the market. And, every day in every way, we're producing quality Buffs in greater and greater quantity.

"More and Better Buffs For You" is our motto and believe us, that means you are going to have only the very best Buffs it is possible to produce.

Let us hear from you at our new plant offices. Write, wire or phone.

NOW AVAILABLE
Full Disc Buffs of every type, grade and construction . . . in any quantity . . . expertly made of the finest quality sheeting.

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"Interest ME in scientific surface preparation?"

Sure, railroader, because the preparation of chemically clean surfaces of watch gears, pinions and the like *means* better adhesion of electroplates . . . *means* parts that resist impact, wear and corrosion . . . *means* the never-failing timepiece accuracy you and your patrons demand.

The list is long of American precision-instrument builders who rely on specialized Oakite precleaners and electrocleaners. These manufacturers, who work each day to hair-breadth tolerances, expect the same kind of exacting job performance from their suppliers. And with Oakite pre-plating compounds, they get quick, safe and consistent performance.

OAKITE SURFACE-PREPARATION TECHNICIANS have installed precision pre-plating procedures in finishing shops throughout the country. All a plater or finisher need do is call the Oakite Representative near him . . . for free, helpful in-shop counsel and service. Or he may write direct to headquarters for data on specific metal-cleaning or surface-conditioning problems. There is no obligation.

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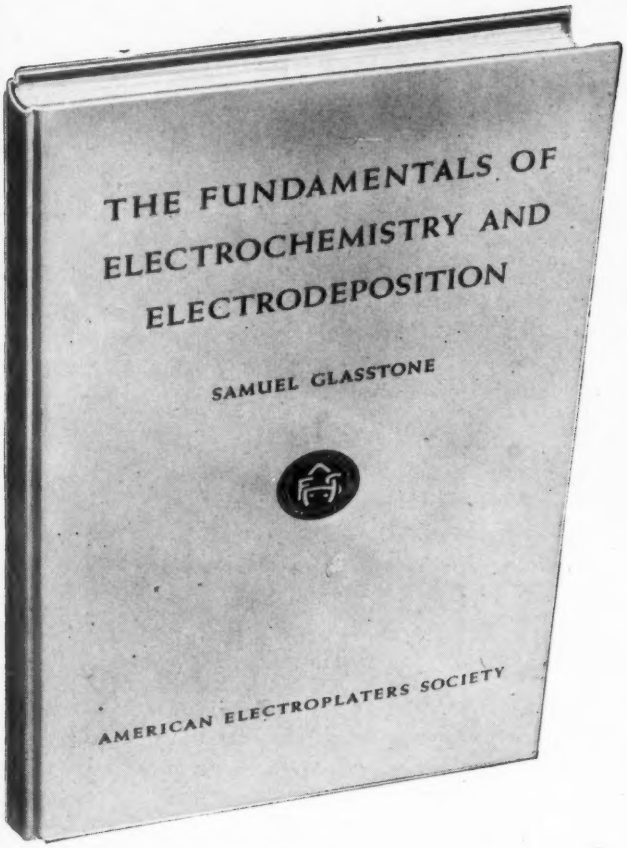
AMERICAN ELECTROPLATERS SOCIETY

34th ANNUAL CONVENTION PROGRAM

DETROIT 1947

AMERICAN ELECTROPLATERS' SOCIETY



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American Electroplaters' Society
P. O. Box 168 **Jenkintown, Pa.**

GREETINGS

We are happy to be hosts to the Thirty-fourth Annual Convention of the American Electroplaters' Society.

Each member of the Detroit Branch feels a personal responsibility for this tremendous undertaking and has appointed himself a committee of one to help make your visit profitable and entertaining.

To the Ladies may we say a special "Welcome". We do want you to have an enjoyable time.

This event inaugurating our combined Convention and Industrial Finishing Exposition has tremendous potential possibilities. We sincerely hope that it will prove to be an eventful milestone in the progress of our organization and will result in more universal recognition and acceptance of the Metal Finishing Industry.

We sincerely appreciate the cooperation of the many firms who have so generously helped in making this Convention and Exposition possible; and to the members of our Detroit Branch may I say, "Thank you".

GEORGE L. NANKERVIS,
General Chairman.

CONVENTION COMMITTEE CHAIRMEN

G. L. NANKERVIS
General Chairman

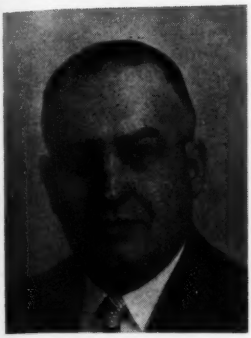
WALTER L. PINNER
General Treasurer

DR. RICHARD B. SALTONSTALL
Education

HERBERTH E. HEAD
Exposition

EDWARD F. BERRY
Exposition

R. L. REDMOND
Entertainment



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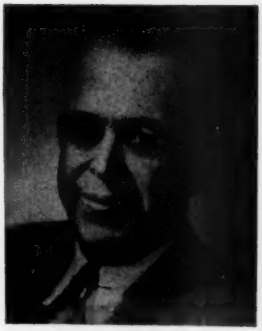
G. A. PILLSBURY
Finance

MRS. GEORGE A. PILLSBURY
Women's

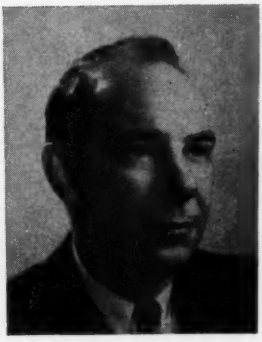
JESS E. BUNCH
Hotel

FRANK L. CLIFTON
Registration



C. L. SOUTHWICK
Transportation

C. R. BEAUBIEN
Plant Visitations



HENRY J. BOCK
Job Shops

B. C. CASE
Program—Finance

GENERAL PROGRAM

Sunday, June 22

3:00 P. M.—Registration, Ball Room Floor, Hotel Statler

Registration Fee: $7.50. This entitles the registrant to a book of tickets to be used for all A. E. S. functions and activities. Registrants need not be members of the Society.

The Hotel Committee is turning over its entire file to the Registration Committee for the duration of the Convention. *Requests for information* concerning hotel reservations should be made at the Registration Desk.

Monday, June 23

8:00 A. M.—Registration, Ball Room Floor, Hotel Statler. Registration Fee for all functions: $7.50

10:00 A. M.—Tour to Greenfield Village and Dearborn Inn—See Ladies' Program

10:15 A. M.—Opening Session, Grand Ball Room, Ball Room Floor, Hotel Statler. *George L. Nankervis*, Convention General Chairman, presiding

Invocation—Dr. Herbert Beecher Hudnut
Formal Opening of 1947 Convention—George L. Nankervis, Convention General Chairman

Program

Welcome to Detroit—Hon. Edward J. Jeffries, Jr., Mayor, City of Detroit
Greetings from the Detroit Branch—W. W. Wilson, President, Detroit Branch
Report of the President—Frank K. Savage, A. E. S. President

12:30 P. M.—International Fellowship Club's Annual Luncheon (for suppliers and their representatives only), Michigan Room, Hotel Statler
Following the luncheon will be election of officers for the coming year and a discussion of arrangements for the Open House.

2:00 to 4:30 P. M.—First Educational Session. Grand Ball Room, Hotel Statler. *Charles L. Faust*, Battelle Memorial Institute, presiding

1. *Stress in Electrodeposits and Its Significance*—K. G. Soderberg and A. K. Graham, Graham, Crowley & Associates, Inc.
2. *Stress in Electrodeposited Nickel*—William Phillips and F. L. Clifton, General Motors Research Division
3. *Physical Properties of Electrodeposited Chromium*—Abner Brenner, Polly Burkhead and Charles W. Jennings, National Bureau of Standards
4. *Bright Brass Plating of Zinc Base Die Castings*—Stanley J. Beyer, Hart Manufacturing Company, formerly with Buffalo Plating Company

8:30 P. M.—Open House, Grand Ball Room, Hotel Statler
Dancing—Buffet Lunch—Refreshments
The Open House is held on the first night of the Convention to provide an opportunity for all registrants to become acquainted. It is sponsored by the International Fellowship Club, an organization formed to create goodwill in the Metal Finishing Industry. Membership in the Club is restricted to manufacturers, supply houses, and their representatives serving the Metal Finishing Industry, and it is through their generosity that the Open House is made possible. A program including a list of contributors will be distributed.
A ticket for this event is included in your registration booklet.

Tuesday, June 24

8:00 A. M.—Registration, Ball Room Floor, Hotel Statler. Registration Fee for all functions: $7.50

8:30 A. M.—WWJ Coffee Club Broadcast, WWJ Building—See Ladies' program

9:30 A.M. to 12 Noon—Second Educational Session, Grand Ball Room, Hotel Statler. *Floyd F. Opplinger*, E. I. du Pont de Nemours & Company, presiding

1. *Modern Applications of Electroplating Solution Purification*—B. C. Case, Hanson-Van Winkle-Munning Company
2. *Electroforming Pitot Static Tubes*—Alfred S. Kasdan, Kollsman Instrument Division, Square D Company
3. *Chemical Deposition of Nickel and Cobalt*—Abner Brenner and Grace Riddell, National Bureau of Standards
4. *Recent Developments in the Use of Conversion Coatings on Zinc*—J. E. Stareck and W. S. Cibulskis, United Chromium, Incorporated
5. *Bulk Nickel Plating*—Henry Strow, Mac Dermid, Incorporated

12:00 Noon—Contract Plating Shop Operators' Luncheon, Michigan Room, Hotel Statler
Your host is the Plating Institute of Michigan.

12:30 P. M.—Golf Tournament, Western Golf Club, *Joe Duffy*, Chairman
This tournament is sponsored by the International Fellowship Club. Prizes will be awarded for certain accomplishments. Luncheons will be available at the Golf Club.
Buses will leave the Bagley Street entrance of Hotel Statler at 12:30 P. M.

(*Program continued page 662*)

A. E. S.
CONVENTION COMMITTEES

General Chairman
GEORGE L. NANKERVIS
George L. Nankervis Company

General Treasurer
W. L. PINNER
Houdaille-Hershey Corporation

Exposition
HERBERTH E. HEAD, *Co-Chairman*
Briggs Manufacturing Company
EDWARD F. BERRY, *Co-Chairman*
Detroit Plating Industries
LAWRENCE V. NAGLE
The Udylite Corporation
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The Udylite Corporation
ROBERT H. DUDLEY
United Chromium, Inc.
STANLEY S. KRENTEL
A. H. BEEBE
Chrysler Corporation
C. F. NIXON
Fisher Body-Ternstedt Div., G. M. C.

Entertainment
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Automotive Rubber Company
B. C. CASE
Hanson-Van Winkle-Munning Co.
C. L. SOUTHWICK
A. T. Wagner Company
HAROLD M. CHERRY
George L. Nankervis Company
HENRY J. BOCK
Auto City Plating Company
A. L. SCAFURI
Belke Manufacturing Company
HOWARD J. WARD
The Udylite Corporation
HOWARD MCALEER
Formax Manufacturing Company

Hotel
JESS E. BUNCH, *Chairman*
Cadillac Motor Car Div., G. M. C.
HARRY M. BLUM
Cadillac Motor Car Div., G. M. C.
HARRY BENNER
E. I. duPont de Nemours & Co.

Registration
FRANK L. CLIFTON, *Chairman*
General Motors Research Div., G. M. C.
MRS. FRANK L. CLIFTON
EARL L. MORRISON
Budd Wheel Company
EDGAR A. HAHN
Ainsworth Manufacturing Corp.

Transportation
C. L. Southwick, *Chairman*
A. T. Wagner Company
Harry E. Moser
McCord Corporation
Francis J. Newton
Detroit Bumper Division
Houdaille-Hersey Corporation

Plant Visitations
C. R. Beaubien, *Chairman*
Wyandotte Chemicals Corporation

Job Shops
Henry J. Bock, *Chairman*
Auto City Plating Company

Program
B. C. Case, *Chairman*
Hanson-Van Winkle-Munning Co.
L. M. Morse
Chrysler Corporation

Branch Exhibits
Arthur W. Logozzo, *Chairman*
The Nutmeg Chrome Corp., Hartford, Conn.

Woman's
Mrs. George A. Pillsbury, *Chairman*
Mrs. Walter Pinner
Mrs. Howard Knight
Mrs. George L. Nankervis
Mrs. Wright W. Wilson
Mrs. O. H. Laidy
Mrs. Carl E. Heussner
Mrs. C. F. Nixon

Finance
George A. Pillsbury, *Chairman*
Pillsbury Chemicals Company
B. C. Case, *Co-Chairman*
Hanson-Van Winkle-Munning Co.
James J. Malone
L. M. Morse
Chrysler Corporation
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Auto City Plating Company

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Honorary Members of the A.E.S.

Dr. William Blum	Baltimore-Washington Branch
Mr. Charles S. Taylor	Boston Branch
Dr. O. P. Watts	Chicago Branch
Mr. Walter Fraine	Dayton Branch
Mr. Ernest Lamoureux	Los Angeles Branch
Mr. Daniel Wittig	Milwaukee Branch
Mr. John Feely	Montreal Branch
Mr. George B. Hogaboom	Newark Branch
Mr. Horace Smith	Newark Branch
Mr. Thomas Brosnan	New Haven Branch
Mr. George Gehling	Philadelphia Branch
Dr. Hiram Lukens	Philadelphia Branch
Mr. S. P. Gartland	Rochester Branch

Program

(*Continued from page 659*)

Afternoon—Visit to the Industrial Finishing Exposition, Convention Hall, out Woodward Avenue.

This time has been set aside especially for members, wives, friends and guests to permit a leisurely inspection of the exhibits prepared by over one hundred nationally known manufacturers. See the latest developments in metal finishing, plating equipment and materials—witness actual plating operations—meet the men responsible for the industry's advancement.

You will be astounded and pleased at the magnitude of the show and, we know, will enjoy it.

Afternoon—Special Plant Visits for those unable to participate in the regular plant visits arranged for Friday, June 27

If you are unable to arrange the visits you desire to make, *fill out the form* accompanying the registration booklet and give all requested information. Every effort will be made to assist you.

For information about specific plant visits, *contact Mr. C. R. Beaubien*, Chairman of the Plant Visitation Committee.

The planned visits are not as extensive as on Friday, June 27. If at all possible, stay through Friday and visit the large production plants which are famous throughout the world.

Note: The committee does not allocate new cars.

Transportation will be provided and will leave from the Bagley Street entrance of Hotel Statler.

8:00 P. M.—Moonlight Cruise on Lake St. Clair. "Put-in-Bay," which has been engaged for Convention visitors' exclusive use, will sail at 8:45 P. M. from the dock at foot of First Street and return at 11:45 P. M.

Music—Dancing—Refreshments

Shuttle buses will leave the Bagley Street entrance of Hotel Statler for the dock beginning at 8:00 P. M. and meet you at the dock on your return.

Tickets included in the registration booklet.

Wednesday, June 25

8:00 A. M.—Registration, Ball Room Floor, Hotel Statler. Registration Fee for all functions, $7.50

9:30 to 12:00 Noon—Third Educational Session, Grand Ball Room, Hotel Statler. *Arthur McNeil*, MacDermid, Incorporated, presiding

1. *Manufacturing Process for Standard Sixty-Inch Reflector*, A Sound Film in Color—Engineer Board, Ft. Belvoir, Va.
2. *Barrel Chromium Plating*—G. Dubpernell and S. M. Martin, United Chromium, Incorporated
3. *Health Hazards in the Electroplating Industry*—J. E. Molas, City of St. Louis
4. *Standardization of Buffing for Preparation of Atmospheric Exposure Test Panels*—C. C. Cupps, Standard Steel Spring Company, and A. K. Graham, Graham, Crowley & Associates, Inc.
5. *Evaluation of Buffability of Nickel Deposits*—R. D. Miller, Bumper Division, Electric Auto-Lite Company, and A. H. DuRose, Harshaw Chemical Company

11:30 A. M.—Ladies' Luncheon at Detroit Yacht Club—See Ladies' Program

12:15 P. M.—Men's Luncheon at Masonic Temple, courtesy Job Shop Operators of Detroit and Surrounding Territory

Guest Speaker—Edgar A. Guest

Buses will leave the Bagley Street entrance of Hotel Statler at 12:15 P. M.

Tickets included in registration booklet.

2:30 to 5:00 P. M.—Fourth Educational Session, Grand Ball Room, Hotel Statler. *E. T. Candee*, The American Brass Company, Chairman A. E. S. Research Committee, presiding

Program

Reports on A. E. S. Research Committee activities

1. Project No. 2—*Extraction Methods Applied to Electroplating Baths—Determination of Zinc and Other Impurities in Nickel Plating Solutions*—E. J. Serfass, Lehigh University
2. Project No. 4—*Effect of Surface Finish of Non-Ferrous Base Metals on Protective Value of Plated Coatings*—George I. Kahan, U. S. Time Corporation
3. Project No. 5—*Some Effects of Copper in Nickel Plating Solutions*—D. T. Ewing, Michigan State College
4. Project No. 6—*Protective Power of Electrodeposits*—N. Thon, Princeton University

6:30 P. M.—Job and Contract Shop Operators' Dinner, Michigan Room, Hotel Statler
Sponsored by the National Association of Metal Finishers.

7.30 P. M.—Special Business Meeting, Hotel Statler.

Thursday, June 26

8:00 A. M.—Registration, Ball Room Floor, Hotel Statler. Registration Fee for all functions: $7.50

8:00 A. M.—Breakfast Meeting of the A. E. S. Research Committee (members only), Ivory Room, Hotel Statler

8:30 A. M.—Ladies' Breakfast in J. L. Hudson Company's Store—See Ladies' Program

9:30 A. M. to 12:00 Noon—Fifth Educational Session, Grand Ball Room, Hotel Statler. *R. M. Wick*, Bethlehem Steel Company, Chairman, Research Directing Sub-Committee of the A. E. S. Research Committee, presiding

1. Project No. 7—*Evaluation of Methods for Determining the Thickness of Electrodeposited Coatings*—Harold J. Read, Pennsylvania State College
2. Project No. 8—*General Considerations of Experimental Methods for Determining Polarization*—Alfred L. Ferguson, University of Michigan
3. Project No. 9—*Physical Properties of Electrodeposited Metal*—Abner Brenner, National Bureau of Standards
4. Project No. 10—*Present Status of Plating Room Waste Disposal*—B. F. Dodge and D. C. Reams, Yale University

Friday, June 27

All Day—Plant Visits
The following concerns have agreed to allow visitors to the A. E. S. Convention to inspect their plants, except that they reserve the right to refuse admittance to any individual whose presence they feel is prejudicial to their interests.

8:30 to 10:00 A. M.—Fisher Body-Ternstedt Division of General Motors Corporation, West Fort Street at Livernois Avenue
This large and interesting plating plant is devoted to the buffing and plating of steel, brass, and stainless steel for automotive hardware. Almost all equipment is automatic.
The group will *leave Hotel Statler* at 8:30 A. M. and return between 9:30 and 10:00 A. M.
Arrangements can be made for additional groups which may visit this plant at 9:30 A. M. and 1:30 P. M.

9:00 to 10:30 A. M.—C. M. Hall Lamp Company
Visitors will see the pressroom for stamping lamp bodies, reflectors, etc.; the polishing and buffing room with hand and automatic operations; the plating room with full-automatic, semi-automatic and hand operations in copper, nickel, chromium, zinc and cadmium, also barrel plating and automatic painting operations. *Buses* leave the Bagley Street entrance of Hotel Statler at 9:00 A. M.

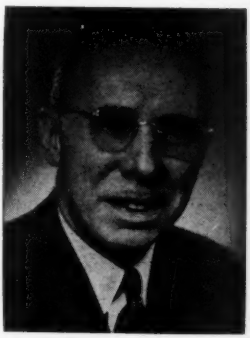
(*Program continued page 666*)

The Detroit Branch is the largest and one of the most active Branches of the American Electroplaters' Society. The Officers and Board of Managers, who ably guide its affairs, are pictured here.

DETROIT BRANCH

WRIGHT W. WILSON
President
Graduate of Michigan State College, 1924. Employed by General Spring and Bumper Corporation; Chrysler Corporation; now associated with Vickers, Inc.

G. L. NANKERVIS
First Vice-President
Active member of A. E. S. Detroit Branch for over twenty years. Engaged in distribution of electroplating equipment and supplies for 27 years. President of George L. Nankervis Company, Detroit



EDGAR A. HAHN
Second Vice-President
Graduate of University of Michigan, 1926. Active in electroplating and metallurgical work since. Chief Metallurgical and Chemical Engineer of Ainsworth Manufacturing Corporation for past 17 years

FRANK L. CLIFTON
Secretary-Treasurer
Active member of A. E. S. for many years. Research Engineer for past 26 years with General Motors Research Laboratories, mainly on electroplating problems

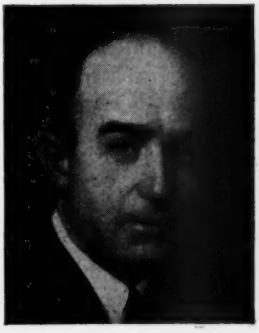
G. A. PILLSBURY
Librarian
Graduate of Carnegie Institute of Technology, 1933. Continuously engaged in the distribution of electroplating supplies since. Now President of Pillsbury Chemical Company

ROBERT H. DUDLEY
Publicity Chairman
Graduate of Pratt Institute, Brooklyn, N. Y., 1929. With United Chromium, Incorporated, since graduation. At present, District Manager

OFFICERS 1946-47

EDWARD F. BERRY
Board of Managers
Graduate of University of Pittsburgh, 1926. Chemist with Aluminum Company of America; Editor of Iron and Steel Publishing Co.; Adv. Mgr. of Udylite Corp.; now Gen. Mgr. of Detroit Plating Industries

C. F. NIXON
Board of Managers
Graduate of University of Wisconsin, 1923. With Western Clock Company for six years. With Fisher Body, Ternstedt Division, G. M. C.; at present Director of Process Engineering



WALTER L. PINNER
Board of Managers
Graduate of University of Michigan, 1923. With Houdaille-Hershey Corp. since. Now Mgr. Research and Development. Four A. E. S. Gold Medals' A. E. S. President, 1945-1946

Program

(*Continued from page 663*)

9:00 A. M.—Wyandotte Chemicals Corporation, Wyandotte, Mich.
The soda ash plant, the coke ovens and the dry ice plant will be shown.
Buses leave the Bagley Street entrance of Hotel Statler at 9:00 A. M., and guides will explain points of interest along the down-river route.

9:30 A. M.—Cadillac Motor Car Division, General Motors Corporation
Visitors will be shown a newly designed and installed plating plant in operation incorporating the latest automatic equipment.
Buses leave the Bagley Street entrance of Hotel Statler at 9:30 A. M.

9:30 A. M. to 1:00 P. M.—Ford Motor Company, River Rouge, Mich.
The Plating Sections in the Rolling Mill and the Motor Assembly Plant will be shown, and the Final Assembly Line will be toured.
Buses leave the Bagley Street entrance of Hotel Statler at 9:30 A. M.

9:30 to 11:00 A. M.—Chevrolet Forge Division of General Motors Corporation, Holbrook Avenue
This plant will be inspected in the following order: Bumper manufacture, including shearing, hot forming, quenching, and tempering (also manufacture of coil and other springs as well as drop forging of crank shafts)—Bumper finishing, including pickling, polishing (with wheel set up), automatic copper and nickel plating, nickel buffing and chromium plating.
For *transportation* information inquire at the Registration Desk.

10:00 A. M. to 3:00 P. M.—Pontiac Motor Division of General Motors Corporation
Private escorts will show the largest individual plating machine in the world, 660 feet long, capable of producing 22,500 square feet of copper-nickel-chromium plate per eight-hour shift or 1½ acres of plate per day. A novel feature is the completely automatic loading and unloading devices.
The Pontiac Motor Division will be the host at a *luncheon.*
Buses will leave the Bagley Street entrance of Hotel Statler at 10:00 A. M. and Pontiac at 2:00 P.M.

10:00 A. M.—Motor Products Company
This trip will permit the inspection of manufacturing processes including an efficient automatic plating line for automatic parts such as windshield and ventilator frames.
Buses leave the Bagley Street entrance of Hotel Statler at 10:00 A. M.

1:00 P. M. to 10:00 P. M.—Visit to Industrial Finishing Exposition, Convention Hall, 4484 Cass Avenue
Shuttle buses leave the Bagley Street entrance of the Hotel Statler at regular intervals during the day.
Do not fail to visit the Exposition.

Branch Exhibits

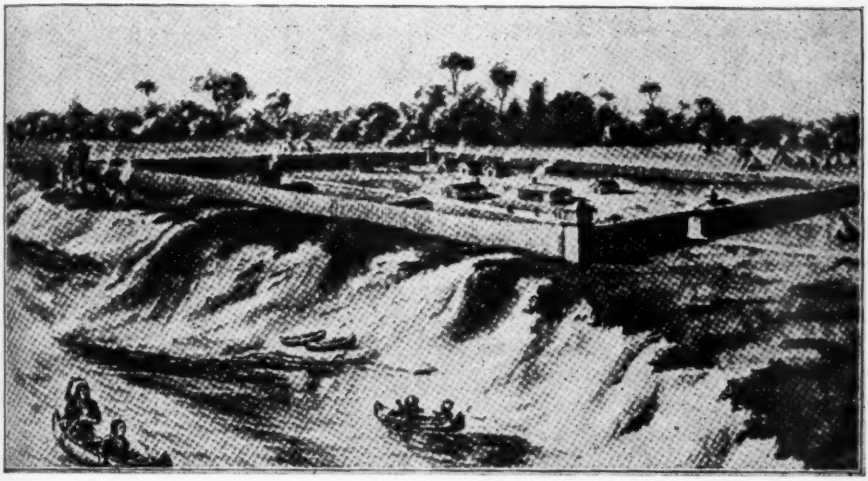
A number of the Branches and individual members have prepared exhibits of finished articles which will be on view in the foyer leading to the Grand Ball Room.

These exhibits will be judged by a Committee for general make-up, practical value and quality of finish, disclosure of new or improved methods, and special skill and effort.

The exhibit awards will be distributed at the Banquet on Thursday evening, June 26.

Detroit

1947 CONVENTION AND EXPOSITION CITY



The City of Detroit, which will be the host to the A. E. S.'s 34th Annual Convention and the Industrial Finishing Exposition, June 23–27, was not always the great industrial center that it is today. Actually the city showed very little promise at first, and it was not until the middle of the 19th century that Detroit began to grow.

The present generation which thinks of Detroit as the hub of the automobile world will find it difficult to assimilate the historical fact that it was founded because of fashion. It was Louis XII of France who one day discarded his velvet cap and appeared in the first top hat of record, a lofty-crowned, narrow-brimmed affair made of the inner fur of the beaver. Detroit became one of the early beaver pelt stations in the wilds of New France, founded in 1701 by the French Officer Antoine Laumet de la Mothe Cadillac. Nothing is left of that old settlement.

Detroit has a checkered early history, having variously been under French, British and American flags before it finally settled down as an American city in 1813.

The zooming growth of Detroit began in 1899 when Ranson E. Olds formed a company to make the Oldsmobile. At that time the city had about 280,000 inhabitants. The history of the automobile industry is too well known to be repeated here. Henry Leland, the Dodge brothers, Ray Chapin, W. C. Durant, Henry Ford and the Fisher brothers are but a few of the outstanding figures in this development whose names come to mind.

But Detroit is more than an automobile city. It is also a center of the stove industry and the pharmaceutical industry, the seed industry and the salt industry, to mention only a few.

Visitors to the Convention and Exhibition will find much of interest in this the fourth city of the country.

TO THE LADIES!

Welcome! Detroit awaits you!

We are ready to entertain you.

We are taking you to the Ford Museum depicting Early American History, and to Greenfield Village, mecca for tourists, with luncheon at the beautiful Dearborn Inn.

You are going to have an opportunity to take part in an early morning radio breakfast program.

Then a luncheon at the spacious Detroit Yacht Club on Belle Isle, from where scores of needle-like boats with their bright sails and fabulous yachts, shiny and powerful, move into Lake St. Clair.

There will be an early morning breakfast in the beautiful Early American rooms of the J. L. Hudson Company, where you will enjoy seeing a mid-season Fashion Show, especially staged for you.

Several other functions have been planned for your pleasure, but we have also arranged the program so you can have time to shop or to visit other points of interest, such as Detroit's widely known Art Museum, across the Detroit River into Canada, or the Cranbrook Academy in Bloomfield Hills.

We hope to have fine weather, but suggest you bring a light top coat, good walking shoes, and a dinner dress for the banquet.

MRS. GEORGE PILLSBURY,
Chairlady, Ladies' Committee.

Ladies' Program

Sunday, June 22

3:00 P. M.—REGISTRATION, Ball Room Floor, Hotel Statler

Registration Fee: $7.50. This entitles the registrant to a book of tickets to be used for all functions.

Request for information regarding hotel reservations should be made at the Registration Desk.

Monday, June 23

8:00 A. M.—REGISTRATION, Ball Room Floor, Hotel Statler. Registration Fee for all functions: $7.50

10:00 A. M.—TOUR TO GREENFIELD VILLAGE AND DEARBORN INN

Buses will leave the Bagley Street entrance of Hotel Statler beginning at 10:00 A. M. A conducted tour of two hours' duration through Greenfield Village, famous for its collections of early Americana, will start upon arrival. You will then be taken by bus to Dearborn Inn for a 1:30 P. M. luncheon. Return trip by bus from Dearborn Inn will start at 4:00 P. M.

Extensive arrangements have been made to make this trip most enjoyable.

8:30 P. M.—OPEN HOUSE, Grand Ball Room, Hotel Statler

Dancing—Buffet Lunch—Refreshments

The Open House is held on the first night of the Convention to provide an opportunity for all registrants to become ac-

quainted. It is sponsored by the International Fellowship Club, an organization formed to create goodwill in the Metal Finishing Industry. Membership in the Club is restricted to manufacturers, supply houses, and their representatives serving the Metal Finishing Industry, and it is through their generosity that the Open House is made possible. A program including a list of contributors will be distributed.

A ticket for this event is included in your registration booklet.

Tuesday, June 24

8:00 A. M.—REGISTRATION, Ball Room Floor, Hotel Statler. Registration Fee for all functions: $7.50

8:30 A. M.—WWJ COFFEE CLUB BROADCAST, WWJ Building, 630 Lafayette Boulevard. Be sure to be there at 8:30 A. M. The program will include special Convention features.

12:30 P. M.—GOLF TOURNAMENT, Western Golf Club—See General Program

Afternoon—VISIT TO INDUSTRIAL FINISHING EXPOSITION, Convention Hall, out Woodward Avenue

You will be interested in the wide range of products finished by electroplating as well as in the working exhibits which demonstrate the latest equipment and processes.

8:00 P. M.—MOONLIGHT CRUISE ON LAKE ST. CLAIR. "Put-in-Bay," which has been engaged for Convention visitors' exclusive use, will sail at 8:45 P. M. from the dock at foot of First Street and return at 11:45 P. M.

Music—Dancing—Refreshments

Shuttle buses will leave the Bagley Street entrance of Hotel Statler for the dock beginning at 8:00 P. M., and meet you at the dock on your return.

Tickets included in the registration booklet.

Wednesday, June 25

8:00 A. M.—REGISTRATION, Ball Room Floor, Hotel Statler. Registration Fee for all functions: $7.50

11:30 A. M.—LUNCHEON AT DETROIT YACHT CLUB. Following a bus trip around Belle Isle, truly a "beautiful island," you will be royally entertained at Detroit Yacht Club through the courtesy of Wyandotte Chemicals Corporation.

Luncheon—Entertainment—Music—Prizes

Buses leave the Bagley Street entrance of Hotel Statler at 11:30 A. M. and start the return trip approximately at 5:00 P. M.

Evening—PERSONAL ACTIVITIES at your leisure

Note: The Industrial Finishing Exposition is open until 10:00 P. M.

Thursday, June 26

8:00 A. M.—REGISTRATION, Ball Room Floor, Hotel Statler. Registration Fee for all functions: $7.50

8:30 A. M.—BREAKFAST IN J. L. HUDSON COMPANY'S STORE, a few blocks down Woodward Avenue.

A varied program has been arranged for your entertainment. There will then be time to inspect the store which is the second largest department store in the country and famous for its variety of goods and services.

Afternoon—OPEN FOR PERSONAL ACTIVITIES

7:00 P. M.—ANNUAL BANQUET, Grand Ball Room, Hotel Statler

Dinner—Distribution of Awards—Floor Show—Dancing

Friday, June 27

All Day—OPEN FOR REST AND PERSONAL ACTIVITIES

INDUSTRIAL FINISHING EXPOSITION

Detroit' Michigan—June 23-27

The main feature of the 34th Annual Convention of the American Electroplaters' Society will be the Industrial Finishing Exposition being held in Convention Hall, "the Home of Detroit's Famous Automobile Shows".

Here, one hundred nationally known manufacturers and suppliers to the metal finishing industry will exhibit the latest metal finishing and plating equipment, processes, materials, services, and plated products.

This, the first Exposition to be conducted by the Society in eleven years, is the opportunity for everyone connected directly or indirectly with the metal finishing industry to see the combined efforts of the industry on display for inspection and discussion in one gigantic arena.

In order that the general public be more intimately acquainted with the importance of plated products in daily life, the Exposition will be open to the public, and it is believed that this will prove to be of educational value to the metal finishing industry as a whole.

One of the outstanding educational features of the Industrial Finishing Exposition will be *a completely equipped plating installation* where souvenirs will be plated and given to Exposition visitors. This plating plant will consist of full-scale plant equipment and will be operated under normal plant conditions. It is believed that this exhibit will illustrate to the public how plating procedures are conducted.

Fully automatic and semi-automatic plating and processing machinery will be in operation in several booths, and exhibitors will show full-scale production units.

Automatic polishing and buffing equipment will be in operation. Special emphasis will be laid on the application of buffing compounds, and both *mechanical applicators and the latest spraying devices* will be shown.

A graphic illustration of *the largest plating installation in the world* will be the feature of one important display. The complete operation of this huge plant will be shown in mural-style photographs and charts.

One of the most interesting developments to reach the electroplating industry in some time is the matter of *generator control for "current reversal"*. This will be one of the feature attractions of a prominent display which will include recent developments in *temperature, automatic fluid or solution level controls.*

All of the important *generator and rectifier* manufacturers will have their products on display, and representatives will be present to explain the details of each product.

The *latest processes* in copper and nickel plating as well as new rust-proofing processes with recently developed supplementary protective coatings will be there for investigation.

For those interested in the protection of the "plating room tool", the plating rack, *new rack coatings* will be displayed, as will *lacquers* for special finishes.

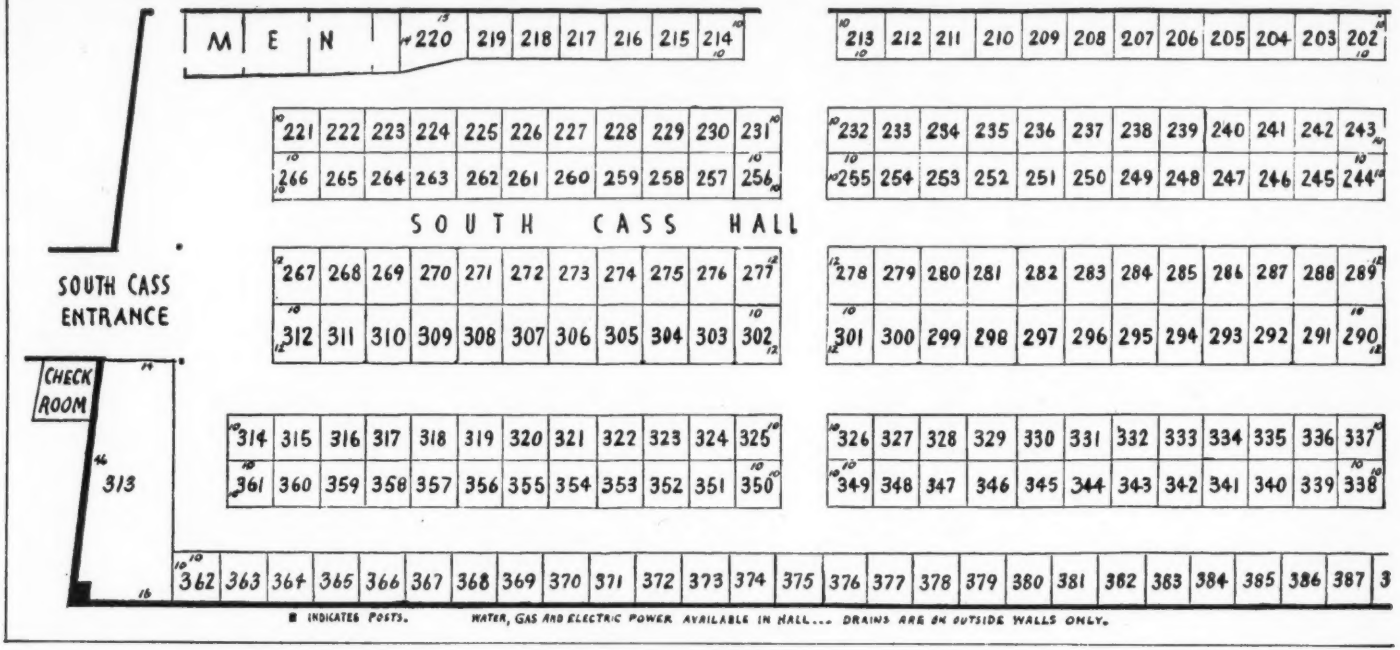
New *cleaning* developments, *degreaser* equipment and applications, complete *filter* equipment and accessories will be presented.

Safety engineers will be particularly interested in seeing new methods and ideas for the safe handling of acids and other materials.

Truly, the Industrial Finishing Exposition will be the mecca for A. E. S. members, process engineers and technicians, and all operating engineers and executives who will for the first time in over ten years have the opportunity of seeing, investigating, and discussing the latest developments and ideas of the whole metal finishing industry.

GUIDE TO EXHIBITS

CONVENTION HALL
4484 CASS AVENUE
DETROIT, MICHIGAN



■ INDICATES POSTS. WATER, GAS AND ELECTRIC POWER AVAILABLE IN HALL.... DRAINS ARE ON OUTSIDE WALLS ONLY.

Floor Plan

INDUSTRIAL FINISHING EXPOSITION

Convention Hall

DETROIT, JUNE 23-27, 1947

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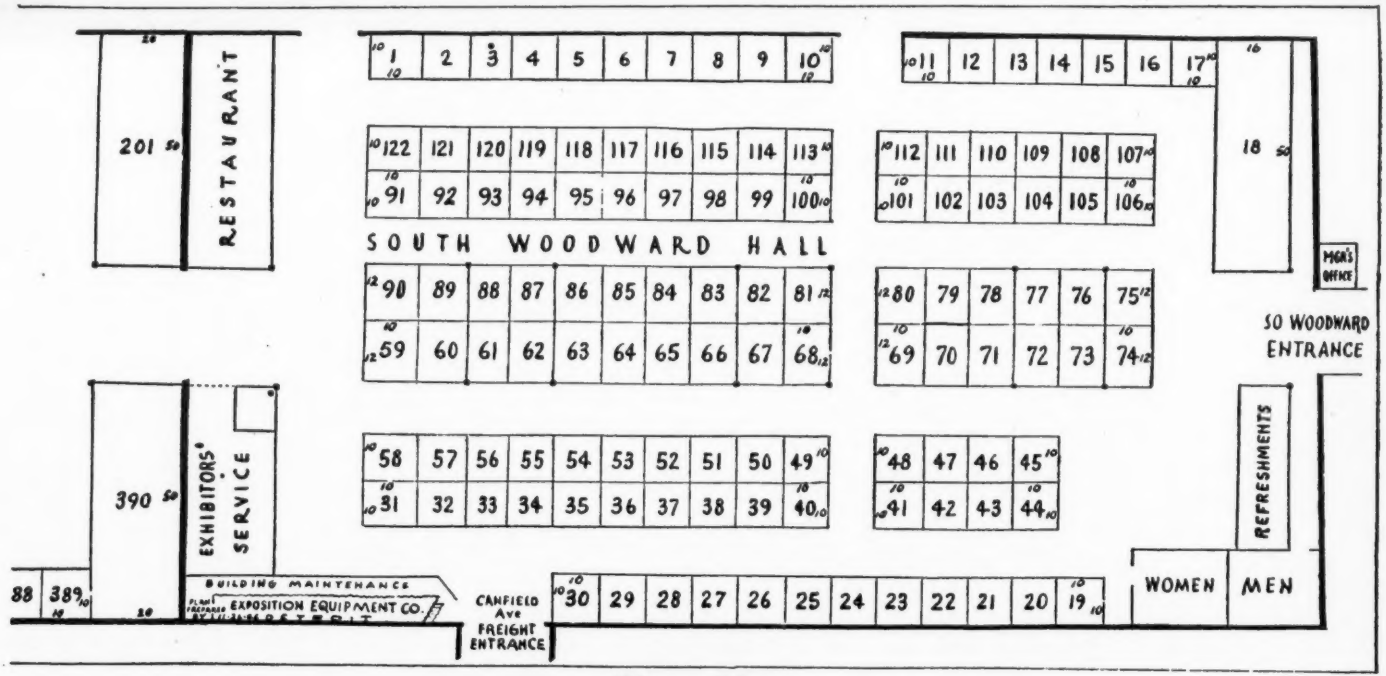
PLAN CONTINUED AT BOTTOM OF PAGE 53



Floor Plan

INDUSTRIAL FINISHING EXPOSITION

Convention Hall

DETROIT, JUNE 23-27, 1947

PLAN CONTINUED FROM TOP OF PAGE 52

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Aget-Detroit Company, Ann Arbor, Mich.	84
Alsop Engineering Corporation, Milldale, Conn.	248
Aluminum Company of America, Pittsburgh, Pa.	223–224
American Buff Company, Chicago, Ill.	340
American Instrument Company, Silver Spring, Md.	316
American Rolling Mills Company, Middletown, Ohio	221–222
Auto City Plating Company, Detroit, Mich.	61
Automotive Rubber Company, Inc., Detroit, Mich.	249–250
Bart-Messing Corporation, New York, N. Y.	261
Barwin Company, Oronoque, Conn.	19
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Behr-Manning Corporation, Troy, N. Y.	317–318
Belke Manufacturing Company, Chicago, Ill.	24–25
G. S. Blakeslee & Company, Cicero, Ill.	382
Bruce Products Corporation, Detroit, Mich.	277
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The Chemical Corporation, Springfield, Mass.	219
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Detroit Chemical Specialties Company, Dearborn, Mich.	321
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Gate City Plating Works, Kansas City, Mo.	231
General Chemical Company, New York, N. Y.	371
General Electric Company, Bridgeport, Conn.	280–281
Gerity-Michigan Die Casting Company, Adrian, Mich.	232–233
W. Green Electric Company, Inc., New York, N. Y.	50
Frederick Gumm Chemical Company, Inc., Kearny, N. J.	20–21
Hammond Machinery Builders, Inc., Kalamazoo, Mich.	65–68
Hanson-Van Winkle-Munning Company, Matawan, N. J.	201
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Michigan Chrome and Chemical Company, Detroit, Mich.	49
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Milwaukee Motive Manufacturing Company, Milwaukee, Wis	324
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Oakite Products, Inc., New York, N. Y.	212–213
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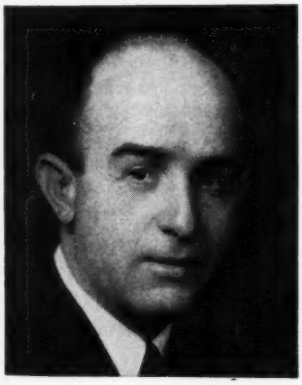

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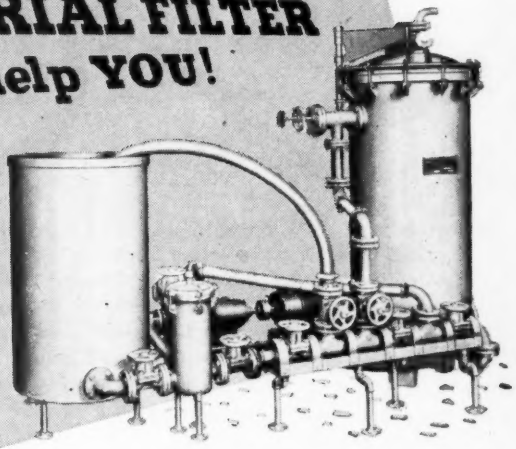

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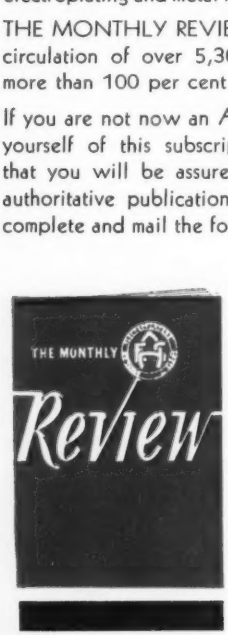

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ANNUAL REPORTS

PRESIDENT'S REPORT

Last June the great honor of the Office of President was voted me by the assembled Delegates of this Society. At that time I promised to endeavor to give you as efficient an administration as the Society had been enjoying in the past. It has been a distinct pleasure during this year to work with the Executive Board. Every Officer has actively and aggressively worked on his assigned duties and on the many special problems which have come before the Board this year. Every Officer has attended every Executive Board meeting, and all of the voluminous correspondence has been promptly answered. I wish to take this opportunity to express my appreciation to the other members of the Executive Board for their cooperation, hard work, and industry. Even though the Officers' traveling expenses were raised last year, the allowances are still insufficient to meet the necessary travel demands. The corporations for which these men work have not only paid the balance of the expenses but have cooperated handsomely insofar as the personal time required by each Officer to take care of his Society obligations is concerned. This, I feel strongly, should not go unnoticed.

Shortly after the beginning of this fiscal year, I submitted to the Executive Board a program for our activities. This program, which was enthusiastically ratified by the Board, was in harmony with the spirit of the previous administration and the general broad aims set forth in the Constitution. In fact, many of the objectives in this year's program were a continuation and amplification of things already begun in previous years. The following is a report of the accomplishments.

At the last Convention, the assembled Delegates authorized the appointment of a Constitution Revision Committee to study the present Constitution and to bring to this Convention its recommendations for a new Constitution to fit our present status as a powerful technical society. With the consent of the Executive Board I appointed Mr. Walter Pinner, the immediate Past-President, Chairman of this committee. This selection was a logical choice of a man who as an Officer of the Society understood its workings and needs thoroughly and who as an individual always has kept the good and welfare of the Society foremost and worked unceasingly to promote Society interests. Mr. Pinner, in turn, carefully and wisely selected his committee which is very well balanced in both territorial distribution and experience. The Committee had several meetings and voluminous correspondence. After a great deal of work and study, it has presented a proposed Constitution for your consideration at this Convention. As President of the Society I wish to compliment and thank this Committee for its hard work and able accomplishments. It is my fondest hope that during my administration this Constitution or at least a suitably modified form of it may be ratified at this Convention, and thus not only bring our financial structure into a healthy condition but also remove the objectionable features of the present Constitution brought

about by our numerical growth and by the numerous activities with which we are now identified. May I respectfully ask each Delegate, in considering the proposed document, to lay aside personal prejudice as well as Branch prejudice and to consider only the greatest good of the Society?

Inasmuch as a technical society should continue to grow as long as there are nonmembers among the individuals interested in the profession, our program called for another large increase in membership. The Second Vice-President's report, that of Mr. Sam Johnston, sets forth the details of the membership campaign. In general, the net increase in membership this year, although considerable, is lower than the years immediately preceding. While the number of new members has been gratifyingly high, suspensions and resignations greatly reduced the net gain. This was to be expected during a reconversion period as people temporarily employed in the plating profession during the war left to re-enter other fields. The number of suspensions has shown a healthy determination on the part of individual Branches not to carry dead wood. The membership situation in the light of these facts is good. We have a larger, more interested and more active membership than last year. One new charter was awarded, to the extremely active Southeastern Branch.

During the previous administration, a committee was appointed to start the formulation of an *Electroplaters' Handbook*. I reappointed the same committee and chairman, Dr. Charles Faust, and added one new member. Due to the press of other important duties on the part of the members, the committee was not active during the early part of this year. Later, it was possible to start serious work, and considerable progress was made. It is my strong recommendation that this committee be reappointed by the next administration. The formulation of a handbook is properly a function of our Society and will add one more accomplishment to our already long list.

Last year, the President in his report recommended an increase in the page size of THE MONTHLY REVIEW. This project is a major one. A considerable part of one two-day Executive Board meeting in February was devoted to the details. This project will be dealt with in more detail in the report of the Executive Secretary. However, a few of the problems were paper, page size, type, printing estimates, advertising rates, subscription rates, mailing costs, and art work. I am pleased to report that the new size is scheduled for the January 1948 issue. A healthy but not excessive backlog of editorial material is available to support an increase in size. Another encouraging fact is the continued increase in quality of the papers published.

The educational activities of the Society are always of major importance and have developed to a point where the duties of the First Vice-President are mainfold. Considerable has been accomplished. I wish to call attention to the outstanding job done by Mr. Huston in completely revising and expanding the *A. E. S. Facts*. The popularity of this leaflet has been tremendous among the Branches which use it for promotional and educational activities. Unceasing efforts and fine Branch cooperation have placed back copies of Society publications in complete or nearly complete sets in a gratifyingly large number of libraries, many of which offer photostating service. Speaker lists were published in THE MONTHLY REVIEW, provisions were made for the translation of foreign articles, the Patent section was expanded, and improvements were made in the Abstract Section.

The Research Program has come to be recognized generally as one of the most unique, worthwhile and ambitious programs ever successfully attempted by a technical society. Our friends in other technical societies have shown gratifying interest in our progress and have cooperated splendidly in encouraging the program. The interest and support of our own Branches has increased greatly as the program became better known and its value more fully appreciated. Industry response has been gratifying. The activities have this year been further expanded by the addition of new projects. There are now a very large number of the most able technical and practical people in the country actively connected with the

program. The program is, therefore, in extremely capable hands. I was personally honored with a seat on the Research Committee at the time it was reactivated and served as the chairman of two different project committees. The outstanding thing I noticed was the lack of difficulty in obtaining able people to work on the program and the universal enthusiasm shown among those people. Many men have given more time than they could conveniently spare, without pay and without expense allowances. This kind of performance is quite different from that usually found in projects undertaken by technical societies. It warrants the wholehearted, active support of every Branch and each member. Obtaining sustaining members and perpetuation of the research should be comparatively easy in the light of available information, data and results.

The Executive Board has successfully cemented even more closely our bonds with other technical societies. I refer particularly to our old friends, the American Society for Testing Materials, the Electrochemical Society, and the Electrodepositors' Technical Society of England. In the case of the latter, there has been considerable correspondence and a number of personal conversations between officers of the two societies concerning closer cooperation, advantageous exchange of publications and in seeking a proper and equitable basis for a possible future merger. No such plan has yet been found which is realistic and practical enough to present to the membership of the two societies. It is gratifying, however, that the friendship and mutual respect has continued and been expanded. It is interesting to note that wherever there is technical society activity, the American Electroplaters' Society is increasingly well represented. An example is that the Board of Governors of the Ohio Chemists' Committee on Professional Practice seats four members of our Society. We are also recognized and admitted to membership in most technical society councils where such organizations exist. We are proud of the fact that our membership is very strong in the associations of manufacturers and job platers interested in the plating industry.

It is with regret that I announce that it has not been possible for a member of the Executive Board to visit all the Branches of the Society. Each year the territory which has to be covered to do this becomes much larger. To do a complete job it would be necessary to travel from Montreal, Canada, to Atlanta, Georgia, north and south, and from New England to Australia, east and west. However, I assure you that every effort has been made, and by far the greater number of Branches have been visited.

At the time this is written, plans have been perfected for what bids fair to be the Society's greatest Convention. The Detroit Branch committees and sub-committees have undertaken a very ambitious programs Branches are responding to Mr. Logozzo's request for exhibits. The manufacturers' Exposition is an assured success. The Society owes a vote of deep gratitude to the Detroit Branch for its generous offer to accept the Convention at the very critical time when it was found impossible for Montreal to accept it because of an unfavorable and unexpected hotel situation. It is only fair to state that Montreal asked for the Convention only after receiving assurance from Montreal hotels of their ability to take care of the meeting. It was some time thereafter that it was found to be impossible.

In conclusion I wish to thank the Society sincerely for the privilege of serving as its President during the past year. On behalf of the Executive Board, I wish to thank the Branches and members for the fine cooperation and courtesies extended to us almost universally in our travels. There have been a few criticisms of the way the business of the Society has been conducted. Each of these has been carefully considered in Board meeting and in each case action taken which the Executive Board felt was the will of the majority. In the five Board meetings which were held during the year, the minutes of which occupy thirty-five pages of single-spaced type, a great many serious problem were considered. One thesis of which we were sure was that a progressive Society must continue to progress. The fine, rapid gains made in the past must be ex-

tended. The respect for our Society felt by other societies, the plating profession, manufacturers, our own membership and the general public must be expanded and justified. This report is respectfully submitted with the full realization that five men could not possibly please five thousand in all matters, but with the firm conviction that we have pleased the great majority.

FRANK K. SAVAGE,
President.

FIRST VICE-PRESIDENT'S REPORT

This Office, with the specific assignment of Educational Chairman, has accepted a number of unusual and special responsibilities in this first post-war year. These activities, which are summarized briefly in this report, reflect the status the Society has assumed in meeting its Constitutional objective of "increasing the knowledge of those occupied in the numerous applications of electroplating" and metal finishing.

As usual, one of the first activities was that of obtaining a list of available speakers for the Branch educational programs. Over two hundred letters were written to supply houses, educational institutions and nationally renowned individuals inviting them to participate in this important function of the Society. The response was most gratifying. The list of Available Speakers published in the October and December 1946 issues contained 95 names and is the largest ever published by our Society.

In this connection, the attention of the Executive Board was directed to the fact that it has become the custom of many of the Branches to obtain speakers for their entire program during the summer months. This procedure precludes the use of the speakers' list prepared by the Educational Chairman regularly appearing in the Fall. In order to improve this situation, it was decided that the Educational Chairman should prepare the list just before he leaves office instead of upon assuming office so that the list could be published in the July issue of THE MONTHLY REVIEW. Accordingly, letters have again been prepared inviting speakers to participate in our Branch educational programs of next winter, and it is hoped that the list appearing in July will be even larger than that prepared last Fall.

The Executive Secretary informed the Executive Board there was a need for information about the Society which could be used in answering letters concerning its function. The Educational Chairman was assigned the task of revising the *A. E. S. Facts*. This revision was published as a four-page, double-faced, two-color pamphlet which also included information concerning the Research Committee. The need for such information is clearly demonstrated by the fact that only 2,000 copies remain six months after publication. It had been estimated that the print order for 10,000 copies would provide a three years' supply.

The work started by Frank Savage and the Secretary to establish a file of THE MONTHLY REVIEW in a library in each Branch city was continued. A talley sheet, permitting easy listing of available issues, was distributed to each member through the Branch Secretaries. At the beginning of this campaign there were three complete sets of THE MONTHLY REVIEW available to the public: one in the Library of Congress, one in the Electrochemistry Division of the National Bureau of Standards, and one established by the Philadelphia Branch in the Logan Free Library.

As the result of this campaign, files of THE MONTHLY REVIEW are now available in the 14 libraries tabulated in the March issue of THE MONTHLY REVIEW, and each library has agreed to maintain these files by subscribing to THE MONTHLY REVIEW.

This activity is continuing, and I hope that the Society can double the number of such libraries during 1947–1948. It is also hoped that the larger Branches, such as Boston, Cleveland, Detroit and New York, will become active in establishing files of THE MONTHLY REVIEW in their libraries during the coming year and provide the Executive Secretary with old issues that may be used to assist the newer Branches in establishing their library files.

I wish to take this opportunity to express the appreciation of the Executive Board for the active cooperation shown by many of the Branches in this activity.

At the suggestion of the Managing Editor of THE MONTHLY REVIEW, Dr. Charles Faust, Dr. William Blum, Dr. Richard Saltonstall, Dr. Walter R. Meyer, Mr. E. R. Holman, Mr. B. C. Case and Mr. Myron B. Diggin were reappointed Associate Editors. During the year Dr. Ralph A. Schaefer was appointed to the staff of Associate Editors. These men have been most helpful in assisting Dr. Graham in the development of editorial policy and providing the type of articles which have increased the prestige of THE MONTHLY REVIEW as a technical journal.

Dr. Harold J. Read was reappointed to prepare the Book Reviews in THE MONTHLY REVIEW.

Arrangements were made with Dr. Charles Faust to prepare abstracts of foreign articles related to metal finishing for THE MONTHLY REVIEW.

It was believed that the policy, established by Frank Savage, of obtaining abstracts for THE MONTHLY REVIEW by screening the abstracts prepared by librarians in industrial plants would provide an ample and satisfactory source of material for the Abstract Section. However, it has been shown that these abstracts are not prepared from the metal finisher's point of view. Efforts are now being made to interest an electroplater, with facilities for reviewing current technical literature, in preparing abstracts for our purpose.

The efforts of Dr. Richard Saltonstall and his committee in charge of the Educational Program for the 1947 Convention have been so well directed that no assistance has been provided by the Educational Chairman in procuring papers for the sessions. However, the Educational Chairman has reported the progress of this activity to the Executive Board at its regular meetings.

As a result of a Philadelphia Branch resolution that the Society use its prestige to have electroplating taught in the public school system, an outline was prepared by Dr. William Blum. This "Outline of Informal Talks on Electroplating for High School Students" was published in the November issue of THE MONTHLY REVIEW.

The attention of the Executive Board was called to a course in metal finishing being offered for the first time at the Rochester Institute of Technology. An outline of the three year cooperative course wherein the student spends part of each year in school and the remainder in industry was published in the February issue of THE MONTHLY REVIEW. Approximately thirty students registered for the course the first year.

In response to a request from Mr. John Lander, instructor of the course, we solicited comments on the course from several colleges. Replies to most of our requests have now been received. They will be summarized, submitted to the Research Committee for review and recommendations, and then will be considered by the Executive Board.

In this connection, it was the consensus of the Executive Board that more courses directly related to metal finishing should be offered by colleges and universities. A survey of existing courses is being made in order to formulate a plan to interest the colleges and universities in making available subjects or courses of specific interest to metal finishers.

The Executive Secretary has received an increasing number of requests for slides or movies to illustrate metal finishing processes. These illustrations are needed primarily for lectures being given in schools on subjects relating to metal finishing. Although the Society cannot furnish this assistance at the present time, arrangements are being made to obtain photographs, probably in the nature of colored 8 mm or 16 mm movies, at the coming Detroit Convention. It is expected to have several metal finishing processes in operation at the Convention which will provide timely subjects for this worthy activity.

Meetings of the Baltimore-Washington, Chicago, Cleveland, Detroit, Newark, New York, Philadelphia, Pittsburgh, Southeastern, Toledo and Waterbury Branches were attended during the year.

These visits were made possible through the courtesy of my employer, The Rustless Iron and Steel Division of the American Rolling Mill Company, and, since January 1st, by the Armco Research Laboratories.

In conclusion, I desire to express my appreciation to the Associate Editors and the Book Reviewer for their efforts in making THE MONTHLY REVIEW a better technical journal and to Dr. Graham and Mr. Soderberg for assisting in the activities of the Educational Chairman by publicizing the "Donate a Volume," "Electroplating in High Schools," and "Electroplating in Colleges" activities.

KENNETH M. HUSTON,
First Vice-President.

SECOND VICE-PRESIDENT'S REPORT

In the organization of the present Executive Board, the duties of Membership Chairman were assigned to the Second Vice-President.

This Society, as has been pointed out many times before, brings a great many benefits to its members. To again enumerate some of these benefits, each member receives THE MONTHLY REVIEW, a monthly publication devoted to the latest technical developments in the field and to spot news of the Society, the Branches and individual members. Each member receives a copy of the *Proceedings*, a printed volume with all the technical papers and discussions given at the Annual Meeting of the Society. In addition, the findings of a comprehensive, fundamental Research Program are made available at no extra cost to all members. This program, sponsored by the Society, has been acclaimed by the technical world and stamps this Society as being both aggressive and progressive.

All people interested in electroplating are not members of the American Electroplaters' Society. A great many people who could contribute greatly to the aims of the Society are not members. It is our duty to bring these people and the Society together.

During the past fiscal year, the number of new elections to membership was 808 for a gain of 17.8 per cent. However, suspensions, resignations and deaths have cut the net gain to 352, or 7.8 per cent. The number of suspensions was unusually high but nonetheless necessary because a non-paying member is a financial burden on the Branch and decidedly unfair to the paying members.

Recognition, in the form of prizes, has long been accorded those Branches whose efforts resulted in the highest percentage gain in membership during the fiscal year. The Executive Board has given study to the form of these prizes, and this year the winning Branches will receive a suitably lettered felt banner which may be used to cover the lectern, the Branch Officers' table at a dinner meeting, or as a wall covering during the Branch meeting. In addition, the winning Branches will be privileged to carry an inscription on Branch stationery denoting that it had won the membership award in its particular group the preceding year.

In the first group, the award goes to the Philadelphia Branch for acquiring 55 new members and a net gain in membership of 28.0 per cent. The second group award was won by the Pittsburgh Branch with 30 new members and a net gain of 29.4 per cent. St. Joseph Valley Branch with 19 new members and a net gain of 40.0 per cent led the third group. Congratulations to the winners and hearty thanks to the other Branches for their efforts in selling our Society.

One charter was petitioned for and granted during this year, Past President W. L. Pinner presenting the Permanent Charter to the Southeastern Branch on December 6, 1946.

The Second Vice-President attended meetings of the Detroit, Waterbury, Cincinnati, Chicago (annual) and Pittsburgh Branches, and others are contemplated. In addition, all meetings of the Executive Board were attended.

Recognition is due my employer, the Weirton Steel Company, who graciously made time and funds available for transaction of Society business.

I take this opportunity to thank the Branches for placing me in high Office in the Society and for their cooperation in the membership campaign. It has been a distinct pleasure to work and serve your interests.

S. S. JOHNSTON,
Second Vice-President.

MEMBERSHIP REPORT

	Membership May 1, 1946	Elected	Reinstated	Transferred In	Unspecified Gain	Transferred Out	Resigned	Suspended	Dead	Unspecified Loss	Net Gain	Membership	April 30, 1947 Honorary	Members in Military Service
Adelaide	37	12	..	..	..	..	..	..	..	..	12	49	..	..
Baltimore-Washington	114	13	..	1	..	3	2	2	..	..	5	119	1	17
Boston	168	17	..	3	..	3	2	19	3	1	— 8	160	1	8
Bridgeport	124	30	..	3	..	2	2	6	..	..	23	147	..	..
Buffalo	87	12	1	1	..	1	1	1	..	..	11	98	..	..
Chicago	359	71	..	7	3	8	4	11	5	2	51	410	1	3
Cincinnati	58	3	1	..	..	4	6	..	..	..	— 6	52	..	..
Cleveland	177	37	..	6	..	4	7	14	1	..	17	194	..	..
Columbus	34	5	1	2	..	..	2	5	..	..	1	35	..	..
Dayton	87	11	1	3	..	2	2	8	..	..	3	90	1	8
Detroit	440	64	3	3	..	18	14	48	3	4	—17	423	..	3
Grand Rapids	116	20	1	4	..	4	1	..	..	..	20	136	..	5
Hartford	134	23	..	2	..	2	5	11	..	..	7	141	..	4
Indianapolis	90	10	3	2	..	..	1	..	1	..	13	103	..	5
Jackson-Lansing	85	4	..	1	..	2	5	33	..	1	—36	49	..	..
Lancaster	38	1	1	..	..	..	..	2	..	..	..	38	..	..
Los Angeles	181	34	..	5	..	..	7	15	2	..	15	196	1	..
Melbourne	59	..	..	2	..	..	..	..	..	..	2	61	..	..
Milwaukee	120	15	..	1	..	2	1	8	1	..	4	124	1	6
Montreal	61	8	..	1	..	..	2	8	..	..	— 1	60	1	1
Newark	243	32	..	3	..	4	5	8	4	..	14	257	2	4
New Haven	110	11	1	1	..	3	2	4	..	..	4	114	1	14
New York	201	65	4	7	..	3	4	7	4	..	58	259	..	3
Philadelphia	170	55	2	3	..	2	3	7	..	..	48	218	2	2
Pittsburgh	97	30	..	3	..	2	1	..	1	..	29	126	..	2
Providence-Attleboro	122	16	..	2	..	..	4	10	..	..	4	126	..	6
Rockford	53	9	..	..	3	..	..	..	..	1	11	64	..	..
Rochester	97	4	..	..	..	3	..	9	1	..	— 9	88	1	2
San Francisco	64	21	1	1	..	..	3	6	1	..	13	77	..	..
Southeastern	..	42	..	3	..	1	..	1	..	..	43	43	..	..
Springfield	82	9	..	1	..	3	4	11	1	..	— 9	73	..	5
St. Joseph Valley	60	19	1	8	..	..	..	..	..	..	28	88	..	..
St. Louis	122	18	..	..	..	..	4	40	..	..	—26	96	..	2
Sydney	82	11	1	..	..	2	5	25	2	1	—23	59	..	..
Syracuse	64	15	..	1	..	2	2	3	..	..	9	73	..	..
Toledo	60	2	..	1	..	2	1	5	..	..	— 5	55	..	2
Toronto	131	19	..	..	..	..	3	2	1	..	13	144	..	..
Twin City	72	28	..	..	..	1	4	..	..	..	23	95	..	..
Waterbury	128	14	1	3	..	2	2	..	3	..	11	139	..	5
Total	4,527	808	23	84	6	85	111	329	34	10	352	4,879	13	107

Note: These are the best figures available in view of uncertainties in Branch reporting.

Necrology

The following members have passed away during the year. Many of them contributed greatly to the advancement of the Society. All are remembered by their Branches and friends.

Boston Branch—Wesley Colby, John F. Nestor, Harry M. Roberts
Chicago Branch—D. English, Jacob Mintz, Raymond Bruske, Henry Hagen, W. Bott
Cleveland Branch—Henry A. Weber
Detroit Branch—P. W. C. Strausser, K. Wall, J. J. Wimpy
Indianapolis Branch—L. T. Nichols
Los Angeles Branch—Fred Maurer, Robert Gripp
Milwaukee Branch—Anton Chlosta
Newark Branch—Harry J. Maurer, Robert Doherty, Joseph A. Fusco, Louis V. Taylor
New York Branch—Frank M. Koeble, Benjamin Nadel, C. Debaun, Ben Popper
Pittsburgh Branch—Stewart Martin
Rochester Branch—Martin Crean
San Francisco Branch—E. F. Dingley
Springfield Branch—Raymond J. Degere
Sydney Branch—D. W. McDonald, D. E. Willoughby
Toronto Branch—Charles Kemish
Waterbury Branch—William J. Cavanaugh, Charles A. Mosgrove, Clinton W. Davison

THIRD VICE-PRESIDENT'S REPORT

Third Vice-President's Report

The main assignment of the Third Vice-President was to be National Exhibits Chairman. The Executive Board voted unanimously to have a commercial exhibition as well as the annual Branch Exhibits at the 1947 Convention in Detroit. There was some objection raised in some quarters by A. E. S. members who thought that the commercial exhibition might help the Society more if it were saved for their particular locale and featured when their Branch was Convention Host.

I would like to emphasize that the A. E. S. has been missing the boat by not commercializing the exhibits at each Annual Convention. The A. S. M., the several plastic societies, and many other technical organizations feature a commercial exhibit displaying their wares to the general public which is an excellent medium for selling the results of the ingenuity of their member ships. I strongly recommend an A. E. S. show of finishes, processes, equipment, etc., in the Grand Central Palace in New York and also in Atlantic City at some future date. This could be arranged in conjunction with the New York and Newark Branches.

The General Chairman of the Detroit Convention, George Nankervis, chose Herb Head and Ed Berry to be Exhibits Co-Chairmen. They immediately made arrangements for holding a *Metal Finishing Exposition* in Detroit's Convention Hall. The January issue of The Monthly Review contained a layout of the Exposition showing location of booths, and all pertinent facts for the prospective buyer of space. Financial success of the Exposition was assured by March 1 at which time over half the space had been sold. The Exposition will feature actual finishing processes,

equipment of all types, and displays of finished products. Speaking of finances in relation to such activities in the future, I'd like to go on record as recommending that the National Office assume financical responsibility after approving the activities of the Host Branch to a National Convention.

The Detroit Convention Committee and the Third Vice President agreed to hold the Branch Exhibits in the Statler Hotel rather than in the Exposition hall. This, we decided, would eliminate any confliction between free and paid space. A gratifying response from the Branches regarding participating was received and a large Branch Exhibit and some personal displays are assured. Prizes will be awarded as usual for these Branch and Indidivual Exhibits.

During the past year I visited New Haven, Bridgeport, Providence, Hartford, Springfield, Detroit, Chicago, Waterbury and Boston Branches and the Indianapolis Regional Meeting (by Cincinnati, Columbus, Dayton, St. Joseph's Valley, and Indianapo-

undertaking. Gratitude is also expressed to lis Branches). Talks were included in the visitations at New Haven, Bridgeport, Providence, Indianapolis Regional, and Boston. Research Committee meetings were attended in Waterbury and Detroit.

I wish to express my gratitude for the wonderful cooperation received from the Society and its members in everything that was undertaken by my Office during the past year.

Particular recognition should be given Herb Head and Ed Berry for their time and effort in handling the *Metal Finishing Exposition*. Only a couple of firm believers in the welfare of the A. E. S. could have made the personal sacrifices they made to assure the success of this monumental Mr. Head's firm, Briggs Manufacturing Company, and to Mr. Berry's company, the Detroit Plating Industries, for granting them time from their duties to pursue this A. E. S. function.

ARTHUR W. LOGZZOO,
Third Vice-President.

PAST-PRESIDENT'S REPORT

It is not customary for the Past-President to report to the Society inasmuch as he is a member of the Board more or less in an advisory capacity without any particular assignment. This year, however, your Past-President was given the assignment to act as chairman of the Constitution Revision Committee. Upon accepting this appointment and with the approval of the Executive Board, the following Committee members were selected: Mr. George Hogaboom, Mr. Thomas Slattery, Mr. Carl Heussner, and Mr. Leslie Borchert.

In selecting this Committee, the welfare of the Society was carefully considered from a number of standpoints. The Committee represents all phases of interest. The combined experiences of the members insures that the Committee is familiar with the background of the Society since its inception and knows the problems encountered during its growth and its needs in the future. For example, Mr. Hogaboom, one of the early A. E. S. Presidents, has been a member of the Society and most actively concerned in its affairs from its inception. Mr. Slattery, also a Past-President, was chairman of the Committee which formulated our present Constitution. Mr. Heussner has been keenly interested in the affairs of the Society for a number of years and has been one of the principal guiding forces in the Research Program which has no equal in any other technical society. In such a capacity, he has been well aware of the problems facing the organization. Mr. Borchert has held local offices, has contributed to the publications of the Society and represents the thinking of the younger membership in the organization.

As a result of two meetings and a very considerable amount of correspondence, copies of the proposed constitution were placed in the hands of the Branches early in February and were published in the March and April issues of THE MONTHLY REVIEW. Action is to be taken on the new Constitution at this Annual Meeting.

With this report to the Society, my activity as A. E. S. Officer comes to a close. During the four years that I have been honored by you, it has been a very great pleasure to serve as a member of the Executive Board. It has involved a considerable amount of work, but the progress made by the Society in which I shall always be most keenly interested has been ample reward for the effort extended.

W. L. PINNER,
Past President.

EXECUTIVE SECRETARY'S REPORT

The total net income for the fiscal year ending April 20, 1947 is $64,722.65 which is about $7,000.00 less than last year and some $3,700.00 over the budget estimate for this year. The net income from advertising is $46,493.59, about $10,700.00 less than last year, and about $1,500.00 under the budget figure of $48,000.00.

The expenses for the fiscal year ending April 30, 1947 total $75,083.30. This figure is about $10,300.00 in excess of the income for the year and about $14,700.00 in excess of the budget figure.

A substantial part of this excess expenditure is due to printing costs being above the budget figures in the amount of $7,873.92 for THE MONTHLY REVIEW and $2,594.90 for the *Proceedings*. According to published reports, production costs in the printing industry have risen on an average some 38 per cent. Too low a budget estimate, increased costs and increases in the number of copies printed explain these excesses. However, inventories of THE MONTHLY REVIEW, the *Proceedings*, and envelopes for mailing our publications have been increased during the year, a return on which should be realized in the months ahead.

Other items contributing to the excess expenditures for the past year are:

1. $484.25 for printing an additional 500 copies of *Glasstone's* book, not previously budgeted, of which sufficient have been sold and ordered to date to guarantee a profit.
2. $815.00 in excess of the budgeted Advertising Expense for THE MONTHLY REVIEW comprising part of the accumulated $3,606.00 commission paid to the former advertising manager. With the total budget figure for the year of $9,600.00 for Advertising Expense, $3,200.00 was expended during the first quarter, but less than $2,400.00 for each of the last two quarters.
3. $838.00 for Promotional Advertising of THE MONTHLY REVIEW, not previously budgeted. This figure is 1.75 per cent of the advertising revenue, a very modest sum compared to that expended by most publications.
4. The Secretary's Office Expense amounts to $5,855.31 which is about $26.00 above last year's figure. The items grouped under this account classification include not only the Miscellaneous Office Expense item for which $3,500.00 was budgeted but also such expenses as item 5 below.
5. $650.00 for Surety Bond for three years at a saving of $125.00 but $400.00 in excess of the budget estimate.
6. The contribution of the Society to th Research Program has continued t[o] increase as the number of Sustaining Members has risen and the magnitude of the program has more than doubled during the past year.

As pointed out in last year's annual report, this Society is too dependent on advertising income for a sound operating basis. A possible solution to this problem is (1) to increase the selling price of our publications to non-members and (2) to increase the income from membership dues.

The 1946 *Proceedings* costs approximately $2.50 per copy, the technical editing having been done at no charge to the Society by William Geissman and others. The selling price was increased to $6.50 per copy. About 4,800 copies were mailed to members at no charge. If all remaining copies were sold, the income would still defray only 25 per cent of the cost of publication. Unfortunately, the *Proceedings* were not available

for sale until April, 1947, so that income from this source is low this year.

Similarly, THE MONTHLY REVIEW costs about $7.50 per year to produce. The subscription price has been $3.00 per year. Recently foreign subscriptions were increased to $4.50 per year to cover extra postage costs. The advertising rates were increased in August, 1946, but in most cases the new rates did not apply until the new contracts became effective about January, 1947. The advertising income approximately covered the cost of THE MONTHLY REVIEW.

The Society receives a per capita tax payment per member of $2.70 per year. For this sum members receive THE MONTHLY REVIEW and the *Proceedings* at a total cost to the Society of about $10.00. As our membership increases under these conditions, the cost to the Society, therefore, increases about $7.30 per member. Considerations such as these have led to the recommendation that the annual membership dues be increased.

There were 6,100 copies of THE MONTHLY REVIEW published in May of this year. The distribution of these included 4,844 to members, 244 to sustaining members, 265 to subscribers, 500 to inventory for resale or library files and the balance to advertisers or prospects. These figures represent a 7 per cent increase in membership, a 47 per cent increase in sustaining members, and a 77 per cent increase in subscribers during the year. The cost of bulk mailing of copies in the United States has been reduced from 3 to 1.5 cents per pound through a ruling of the Post Office Department, Washington, D. C., and a claim for refund of excess previously paid has been filed.

During the year the tax exempt status of the Society as a non-profit corporation and educational society has been established through the Treasury Department, Washington, D. C. As a result, the Society is not obligated to pay Social Security taxes and the employees do not receive Social Security benefits. The Society has been exempt from corporation taxes in the State of Pennsylvania, including the Bonus tax on corporation property. An application for refund of Bonus payments in the previous year has been made. Through the cooperation of our Washington attorney, the Society has also been exempt from payment of the District of Columbia Unemployment Compensation tax on the Research Fellow employed at the Bureau of Standards.

To lay the groundwork for the preparation of complete indexes for THE MONTHLY REVIEW and the annual *Proceedings*, the contents of each of these publications have been tabulated. Considerable time and experience is necessary in order to prepare a worthwhile index. The Executive Board has been investigating possible means of having this work done.

Our advertising manager, A. R. Putnam, has impressed both the National Officers and the members of the Society with his enthusiasm and energetic efforts. He is endeavoring to obtain badly needed information on the readership of THE MONTHLY REVIEW: classification of our members and subscribers with respect to positions held, companies, and size and nature of the operations. Responses to the questionnaire which has been sent to the members have been somewhat discouraging, approximately 40 per cent having replied to date. This effort is being actively continued, and members of the Society are urged to cooperate by replying promptly. Information of this kind is necessary in order to increase the value of THE MONTHLY REVIEW as an advertising medium and thereby increase our advertising revenue.

On August 1, 1946 there were 71 regular advertisers, 27 of whom were advertising without contracts. By November 1, 1946 there were 70 regular advertisers, one advertising without a contract. On April 30, 1947 there were 68 regular advertisers, of which six had new contracts pending and three were advertising without contracts. Cancellations and new business have approximately balanced each other during this period.

Plans for enlarging the size of THE MONTHLY REVIEW by the first of next year have been worked out, but the Executive

Board has not taken definite action on this matter at the time this report is being written. This change would improve the quality and appearance of the publication, should materially assist in increasing the number of advertisers, should increase advertising revenue and enable the Society to pay advertising agency discounts, a recognized practice of the majority of successful publications.

The Associate Editors of THE MONTHLY REVIEW have met on two occasions during the year and have proven very cooperative and helpful to the Editors. These members have given generously of their time in helping to make a better publication and are serving as the Editorial Board on policy matters as well as technical contents. The Society owes them a debt of gratitude for their services.

Our relationships with the Branch Secretaries have continued to improve. Following the Branch Secretaries' meeting at the time of the last Convention, many of the difficulties with the Branches were corrected. Numerous releases to the Secretaries from the National Office have helped, and we are indebted to these gentlemen for their cooperation during the past year. One serious problem involving the maintenance of membership lists and estimation of per capita taxes remains unsolved.

Several Branches have experienced difficulty on changes of Secretaries, owing to the fact that their membership records had not been correctly maintained. In their efforts to straighten out these matters, they have ultimately sent lists to the Secretary's Office with a smaller number of members than previously reported and have requested that the Secretary accept the smaller figure for future per capita tax assessments. The Society's mailing file, which determines the number of copies of our publications sent out, includes the larger number of members, and unless the Branch can submit the names and addresses of those missing, the Society continues to send them publications without receiving any income. Unfortunately, the membership records in the Secretary's Office prepared in the past do not in all cases show the Branches to which a member belongs so that it is not possible to correct the situation entirely from this Office. An effort is being made to settle these differences without imposing a hardship on the Branches in question. It should be evident to the members, however, that this situation can only be corrected through the maintenance of accurate records and the cooperation of all parties.

It is hoped that the Constitution revision will provide for handling all Foreign members from the Secretary's Office. Space doesn't permit a discussion of this matter, but those Branch Secretaries with whom we have had dealings on Foreign membership will undoubtedly welcome such a change.

Some Branches have complained that they have not received adequate coverage in the Branch News department of THE MONTHLY REVIEW. The Editor has never withheld publication unless a news feature announcing a meeting would be past due by the time the next issue reached the members. It is interesting to note that eight Branches have had from 10 to 18 news items published in the past year. Sixteen Branches have had from five to nine news items published, and the published items for the remaining fifteen Branches varied from none to four.

Contents of Monthly Review

MAY, 1946—April, 1947

	Total pages	Average pages per volume	Average per cent of pages
Technical Articles...	228¾	19.1	16.2
Research Project Reports.....	112	9.3	8.0
Abstracts.....	66½	5.5	4.7
Patents.....	21	1.0	1.5
Book Reviews.....	11¾	1.0	0.8
Total Technical....	*440*	*36.7*	*31.2*
A. E. S. Items.....	101½	8.4	7.2
Branch News.....	70¼	5.9	5.0
Membership Reports...	56¾	4.7	4.0
Total Society Items	*228½*	*19.0*	*16.2*
Industry News....	*81¼*	*7.8*	*5.8*
Advertising.....	*623¼*	*51.9*	*44.2*
Miscellaneous.....	*35*	*3.0*	*2.6*
Grand Total....	**1408**	**117.3**	**100.0**

There were 60 more pages in THE MONTHLY REVIEW than in the previous year and, with the decrease in space required for advertising, this resulted in a marked increase in the pages devoted to editorial matter as shown in the accompanying tabulation of contents. The quality of the technical articles has continued to improve, and there is a comfortable backlog of worthwhile papers, all of which has been made possible by the excellent cooperation of the members, the Branches and the Associate Editors.

The employees in the Secretary's Office have worked hard and conscientiously in the performance of their duties. I wish to thank them for their loyalty and cooperation.

A. K. GRAHAM,
Executive Secretary.

GENERAL FUND

STATEMENT OF INCOME AND DISBURSEMENTS

Fiscal Year Ended April 30, 1947

INCOME:		
Advertising	$47,183.58	
Less Discount Allowed	689.99	
		$46,493.59
Sales: THE MONTHLY REVIEW	$1,170.29	
Proceedings	1,223.75	
Glasstone Book	425.07	
Books and Reprints	1,025.23	
Branch Supplies	973.25	
		4,817.59
Per Capita Taxes Levied		12,078.24
Interest on Investments		93.75
Miscellaneous (including Convention profit and refund of $1,234.34)		1,239.48
Total Income		$64,722.65
EXPENSES:		
Advertising Commission	$ 4,330.61	
THE MONTHLY REVIEW	24,873.72	
Proceedings Expense	11,994.90	
Glasstone Book	484.25	
Books and Reprints	622.27	
Branch Supplies	146.35	
Convention Expense	803.33	
Salaries:		
Executive Secretary	4,800.00	
Editor	4,800.00	
Advertising Manager	2,250.00	
Office Employees	9,067.00	
Traveling Expenses:		
Executive Secretary	341.18	
Advertising Manager	1,139.31	
Officers	1,223.93	
Furniture and Fixtures	330.44	
Officers' Office Expense	295.70	
Promotional Advertising Expense	838.00	
Secretary's Office Expenses:		
Rent	925.00	

Telephone and Telegraph	807.35	
Electricity	60.16	
Printing and Stationery	1,016.26	
Postage and Express	967.13	
Insurance	676.26	
Office Supplies	445.84	
Office Equipment	72.50	
Legal and Accounting	442.53	
Miscellaneous Expense	442.28	
Constitution Revision Committee Expense	229.54	
Taxes:		
Unemployment Compensation	519.92	
Social Security	85.34	
Excise	52.20	
Total Expenses (Note B)		$75,083.30
Excess of Expenses over Income (Note B)		$10,360.65

NOTE B: The expenses reported do not take into account the changes during the fiscal year in inventories of publications, literature and supplies, office furniture and equipment, accounts payable and prepaid and accrued expenses.

BALANCE SHEET

April 30, 1947

ASSETS:		
Demand Deposit in Jenkintown Bank and Trust Company	$32,095.29	
Petty Cash	25.00	
United States Treasury Note (Quoted Market Value, $5,059.50)	5,000.00	
Accounts Receivable:		
Advertising, Subscriptions, Books and Reprints	3,306.23	
Per Capita Taxes	758.10	
Branch Supplies	106.45	
Deposit with Bell Telephone Company	200.00	
Total Assets (Note A)		$41,491.07
LIABILITIES AND FUND:		
Taxes Withheld:		
Federal Income	213.80	
Social Security	27.65	
Advance Payments	11.00	
Total Liabilities		$252.45
General Fund Balance shown in Report as of April 30, 1946	51,599.27	
Deduct: Excess of Disbursements over Income Period May 1, 1946 to April 30, 1947	10,360.65	
General Fund Balance April 30, 1947		41,238.62
Total Liabilities and Fund (Note A)		$41,491.07

NOTE A: Exclusive of inventories of publications, literature and supplies, office furniture and equipment, accounts payable and prepaid and accrued expenses.

RESEARCH FUND

STATEMENT OF INCOME AND DISBURSEMENTS

Fiscal Year Ended April 30, 1947

INCOME:		
Sustaining Membership Fees and Subscriptions	$24,513.96	
Interest and Dividends on Deposits	481.63	
Sale of Reprints	188.75	
Miscellaneous	.10	
Total Income		$25,184.44
EXPENSES:		
Salaries: Project Directors and Associates	$14,455.72	
Project Payments to Institutions	4,400.00	
Cost of Reprints	1,255.00	
Supplies	605.20	
Legal Expense	706.20	
Office Expense	548.11	
Miscellaneous	257.86	
Total Expenses		$22,228.09
Excess of Income over Expenses		$ 2,956.35

BALANCE SHEET

April 30, 1947

ASSETS:		
Demand Deposit—Abington Bank and Trust Company	$20,001.38	
United States Treasury bond (Quoted market value $5,111.50)	5,000.00	
Above item omitted from "Balance Sheet" herewith		
The Philadelphia Saving Fund Society	5,075.00	
Atlantic Federal Savings and Loan Association, Baltimore, Md.	5,041.65	
Birmingham Federal Savings and Loan Association, Birmingham, Mich.	5,092.08	
Loyola Federal Savings and Loan Association, Baltimore, Md.	5,031.25	
Baltimore Federal Savings and Loan Association, Baltimore, Md.	5,020.83	
Liberty Federal Savings and Loan Association, Baltimore, Md.	5,020.83	
First Federal Savings and Loan Association of Detroit, Mich.	5,016.65	
Accounts Receivable—Reprints	11.35	
Total Assets		$65,344.3

LIABILITIES:		
Withheld Federal Income Taxes		38.00
Research Fund Balance, shown in Report as of April 30, 1946	62,350.01	
Add: Excess of Income over Disbursements for period May 1, 1946 to April 30, 1947	2,956.35	
Research Fund Balance April 30, 1947		$65,306.36
		$65,344.36

HERMINIE DOROTHEA AND CHARLES H. PROCTOR AWARD FUND

Statement

Fiscal Year Ended April 30, 1947

Demand Deposit—Abington Bank and Trust Company, April 30, 1946	$ 350.00
Award made during period May 1, 1946 to April 30, 1947	100.00
Balance April 30, 1947	$ 250.00

AUDITOR'S REPORT

We have examined the balance sheets of the General Fund and Research Fund of the Supreme Society of The American Electroplaters' Society, Inc., as of April 30, 1947 and the statements of income and expenses of such funds for the year then ended and the statement of the Proctor Award Fund for the fiscal year ended April 30, 1947. In view of the limited number of employees in the office of the Executive Secretary and the resultant limited internal control, we extended our examination of the accounting records and other supporting evidences to the extent we deemed appropriate, but we did not make a detailed audit of the transactions. Our examination was made in accordance with generally accepted auditing standards applicable in the circumstances and included all procedures which we considered necessary except that the amounts due from local Branches of the Society were not confirmed.

In our opinion, based upon such examination, the accompanying balance sheets and related statements of income and disbursements and the statement of the Proctor Award Fund present fairly its position as of April 30, 1947 and the income and expenses for the year then ended.

LYBRAND, ROSS BROS. AND MONTGOMERY.

Dated at Philadelphia, Pa.
May 9, 1947.

RECEIPTS FROM PER CAPITA TAX AND BRANCH SUPPLIES

May 1, 1946 to April 30, 1947

Branch	*Per Capita*	*Supplies*
Adelaide	$ 49.96	$.....
Baltimore-Washington	260.55	23.70
Boston	432.68	32.55
Bridgeport	349.66	66.95
Buffalo	238.28	8.00
Chicago	946.36	46.75
Cincinnati	336.16	4.50

Branch	*Per Capita*	*Supplies*
Cleveland	676.37	29.70
Columbus	118.81	10.60
Dayton	209.93	12.45
Detroit	1,396.59	57.45
Grand Rapids	309.15	30.30
Hartford	357.09	19.25
Indianapolis	301.74	12.70
Jackson-Lansing	226.82	7.50
Lancaster	103.97	4.90
Los Angeles	490.73	96.80
Milwaukee	295.66	9.60
Montreal	152.55	39.05
Newark	778.56	59.50
New Haven	189.01	.....
New York	544.05	41.30
Philadelphia	463.74	25.60
Pittsburgh	203.86	13.50
Providence-Attleboro	236.93	18.10
Rockford	133.02	42.65
Rochester	249.76	11.25
San Francisco	178.22	8.55
Springfield	239.64	5.05
St. Joseph Valley	233.58	33.70
St. Louis	410.05	12.40
Southeastern	41.18	46.05
Sydney	287.56	.....
Syracuse	311.20	8.60
Toledo	149.86	8.30
Toronto	360.46	17.45
Twin City	216.69	31.90
Waterbury	338.86	13.60
Supplies Sold at Convention (1946)	.....	11.80
Total	$12,814.29	$922.05

RESEARCH COMMITTEE CHAIRMAN'S REPORT

The activities of the Research Committee have continued at the same pace set by the previous Chairman. Definite progress has been made in the conduct of the research projects as well as the administrative functions of the Committee. At present seven projects are active and Project No. 4 is expected to be under way by the time the June Convention is held. A summary of the Report of the Chairman of the Research Directing Sub-Committee, Dr. R. M. Wick, is given herewith.

"Mr. William M. Tucker was appointed Vice-Chairman of the Research Directing Sub-Committe to assist Dr. Weisberg and the writer.

"Projects Nos. 1 and 3, on 'Stripping of Copper' and 'Methods for Testing Adhesion', respectively, were placed on inactive status; at least one more paper will be forthcoming from Project No. 3.

"Two projects were initiated, No. 9 on 'Physical Properties of Electrodeposited Metals' at the National Bureau of Standards and No. 10 on 'Disposal of Plating Room Wastes' at Yale University.

"One project, No. 11, on 'Current and Metal Distribution in Electroplating' has been authorized.

"Since the start of the present organization in late 1944, twenty-eight publications have appeared.

"The Society was asked by the Electrodepositors Technical Society of Great Britain that a paper be prepared on the Research Activities of our Society for presentation at the Third International Electrodeposition Conference to be held in London this year.

"Increased liaison with the A. S. T. M. was established to facilitate the work of both organizations in increasing and disseminating technical information and specifications on electroplating."

Aside from this most important phase of the research work, the other two activities consuming the major part of the effort were the solicitation of sustaining members to maintain the funds of the Research Committee at a satisfactory level and plans for more effective publicity of the research work. At present there are 244 sustaining members of the Society, a substantial increase over the 166 members as of May 1, 1946. It is hoped that the Branches will continue their activity in acquiring sustaining members to support this all important work of the American Electroplaters' Society.

It is felt that a substantial proportion of industry as a whole is not only unaware of the activities of the Research Committee but also does not realize the importance of the various research projects. To laymen in general and to many of the members of the Society as well such subjects as "Polarization", "Determination of Impurities" and "Physical Properties of Electrodeposited Metals" seem highly theoretical, and often they find it difficult to comprehend the day-to-day application of such information to their own problems. Actually, the progress that has been made in electroplating over the last twenty years has all begun with the study of fundamentals such as these, all of which appeared at the time to be as impractical as the above-mentioned subjects seem to be today. Without the increased knowledge of fundamentals it is doubtful that such new processes as bright nickel, electropolishing, and many other standard plating processes would be available today. It is recognized by the men working on process development that they are often handicapped by the lack of fundamental knowledge. Few companies can afford to take the time and justify the expenditures for detailed examination of such theoretical subjects. It thus becomes a function of the Society through its Research Committee to conduct such fundamental investigations and make the results avilable to the whole industry. Plating has progressed from a rule-of-thumb art to a carefully controlled scientific production process, but this trend will continue only as long as new basic information is constantly made available.

As Chairman of the Research Committee I strongly urge all members of the Society to stop and think of the progress that has been made in the last twenty years and to consider the very small expenditure of their own money that has been required under the administration of the Research Committee to finance the work which has fostered this progress. With proper support the present rate of advance can be maintained.

The Research Committee has discussed publicizing its work more effectively than is being done today, with the particular purpose in mind of keeping the members of the Society and industry in close contact with the progress of the work. It is expected that the new chairman, Dr. R. M. Wick, will complete these plans and put them into effect early in his administration.

There also seems necessary to undertake another type of publicity, namely concern-

(*Continued on page 701*)

A. E. S. RESEARCH COMMITTEE ORGANIZATION

1946 - 1947

◆ ◆ ◆

Research Committee

E. T. Candee, Chairman
The American Brass Company

Dr. William Blum
National Bureau of Standards

M. R. Caldwell, Vice-Chairman
Doehler-Jarvis Corporation

C. E. Heussner
Chrysler Corporation

Dr. H. L. Kellner
Lea Manufacturing Company

Dr. R. A. Schaeffer
Cleveland Graphite Bronze Company

Dr. Louis Weisberg
Consultant

Dr. W. A. Wesley
The International Nickel Company

Dr. Richard M. Wick
Bethlehem Steel Company

F. K. Savage, A. E. S. President
The Kuehne Manufacturing Company
Ex-Officio Member

Dr. A. K. Graham, A. E. S. Exec. Secy
Graham, Crowley and Associates, Inc.
Ex-Officio Member, Secretary

C. H. Sample
The International Nickel Company
Liaison Member, Committee B-8, A. S. T. M.

Finance Sub-Committee

C. E. Heussner, Chairman
Chrysler Corporation

Dr. H. L. Kellner
Lea Manufacturing Company

Dr. R. A. Schaeffer
Cleveland Graphite Bronze Company

Project Directing Sub-Committee

Dr. Richard M. Wick, Chairman
Bethlehem Steel Company

William M. Tucker, Vice-Chairman
Eastman Kodak Company

Dr. Louis Weisberg, Vice-Chairman
Consultant

Projects

Project No. Year	Title	Location	Project Director and Assistant	Project Directing Sub-Committee
2† (1944)	*Determination of Impurities in Electroplating Solutions*	Lehigh University	Prof. E. J. Serfass Project Director W. S. Levine Assistant P. J. Prang, Jr. Assistant	Dr. D. G. Foulke, *Chairman* Hanson-Van Winkle-Munning Company Dr. W. R. Meyer Enthone, Inc. John Poor, Van Der Horst Corporation
4* (1944)	*Effect of Surface Finish of Non-Ferrous Base Metals on Protective Value of Plated Coatings*	‡	‡	M. B. Diggin, *Chairman* Hanson-Van Winkle-Munning Company E. A. Anderson New Jersey Zinc Co. A. W. Tracy, The American Brass Co.
5‡ (1945)	*Effect of Impurities and Purification of Electroplating Solutions*	Michigan State College	Prof. D. T. Ewing Project Director W. D. Gordon Assistant	B. C. Case, *Chairman* Hanson-Van Winkle-Munning Company L. B. Sperry Doehler-Jarvis Corp. Dr. R. C. Olsen General Motors Corp.
6* (1946)	*Nature and Effect of Porosity in Electrodeposits*	Princeton University	Dr. N. Thon Project Director E. T. Addison, Jr. Assistant	Dr. W. A. Wesley, *Chairman* Internatioanl Nickel Co. Dr. B. Egeberg International Silver Co. A. Mendizza, Bell Telephone Laboratories, Inc.
7*	*Methods for Testing Thickness of Electrodeposits*	Pennsylvania State College	Prof. H. J. Read Project Director J. H. Thompson Assistant	J. Mazia, *Chairman*, American Chemical Paint Co. G. Bowman, Standard Steel Spring Company A. H. DuRose Harshaw Chemical Co.
8†	*Polarization at Electrodes in Electroplating Processes*	University of Michigan	Prof. A. L. Ferguson Project Director B. R. Briggs Assistant	Dr. R. B. Saltonstall, *Chairman*, The Udylite Corporation E. Hahn, Ainsworth Manufacturing Company Dr. G. Dubpernell United Chromium, Inc.

Projects (continued)

Project No. Year	Title	Location	Project Director and Asssistant	Project Directing Sub-Committee
9† (1947)	*Physical Properties of Electro-deposited Metals*	National Bureau of Standards	Dr. A. Brenner Project Director C. W. Jennings Research Associate	Dr. W. Blum, *Chairman* National Bureau of Stand. C. H. Sample International Nickel Co. N. Promisel, Bureau of Aeronautics, Navy Dept.
10* (1947)	*Disposal of Plating Room Wastes*	Yale University	Prof. B. F. Dodge Project Director D. C. Reams Assistant	Dr. C. F. Gurnham, *Chairman*, Whitney-Blake Company M. L. Ross, E. I. duPont de Nemours & Company M. A. Orr, International Silver Company
11† ‡	*Current and Metal Distribution in Electroplating*	‡	‡	‡

*Dr. Louis Weisberg, Vice-Chairman assigned
†W. M. Tucker, Vice-Chairman assigned
Projects Nos. 1 and 3, *Stripping of Copper* and *Adhesion of Electrodeposits*, respectively, have been temporarily discontinued.

‡In process of negotiation.

RESEARCH COMMITTEE CHAIRMAN'S REPORT

(*Continued from page 698*)

ing the value of plating in general. As of today there are many who consider electroplating a poor substitute for hot dip coatings or painting. Other industries continually conduct campaigns to combat false ideas inimical to their interests, and it seems wise that the electroplating industry start doing the same. After careful discussion it has become apparent that this type of publicity is more properly a function of the Executive Committee than of the Research Committee; hence accumulated data on this subject has been turned over to the Executive Committee for its consideration.

In concluding this report, I wish to express my appreciation to the members of the Research Committee, all of whom have carried on the activities assigned to them satisfactorily and without expense to the Research Fund. It is not possible to estimate the value of their services, but it should be obvious to all the members of the Society that it is a substantial portion of the total amount of money expended by the Research Committee. Without the work and expenses contributed by the Committee members, much less could have been accomplished.

E. T. Candee, *Chairman.*

SUSTAINING MEMBERSHIP LIST

as of April 30, 1947

Acme Galvanizing, Inc.
Acme Plating Company, The
Acme Plating Works
Acme Steel Company
Advance Plating Company, The
Ainsworth Manufacturing Company
Aircraft Radio Corporation
Alsop Engineering Corporation
Aluminum Company of America
American Brass Company
American Emblem Company
American Instrument Company
American Optical Company
American Plating and Manufacturing Works
American Radiator and Standard Sanitary Corporation
American Rolling Mill Company, The
American Wire Fabrics Corporation
American Zinc Institute
Apex Plating Company
Apollo Metal Works
Apothecaries Hall Company
Arnold, Schwinn & Company
Ardco, Incorporated
Arrow-Hart & Hegeman Electric Company
Auto City Plating Company
Automotive Rubber Company
C. A. Barnes & Sons
Bacon Felt Company
M. E. Baker Company
Bastian-Blessing Company, The
Beaton & Corbin Manufacturing Company
Bell Telephone Laboratories, Inc.
Belke Manufacturing Company
Berteau-Lowell Plating Works
Bethlehem Steel Company
Brown & Bigelow
Brown-Hutchinson Iron Works
Buckingham Products Company
Canadian Hanson & Van Winkle Company, Limited
Carey-McFall Company
Casco Products Corporation
Charles Parker Company
Chase Brass & Copper Company
Chicago Electro-Platers Institute
Christie Plating Company
Chrome-Rite Company
Chromium Corporation of America
Chromium Process Company, The
Chrysler Corporation
Cinch Manufacturing Corporation
Cleveland Graphite Bronze Company, The
Clinton Company, The
C. G. Conn Company, Ltd.
Corona Corporation
Crown Rheostat & Supply Company
Darco Corporation
Daystrom Corporation
Dayton Rustproofing Company
Detrex Corporation
A. B. Dick Company
Divine Brothers Company
Dixie Electro Plating Company
Doehler-Jarvis Corporation
R. R. Donnelly & Sons Company
Dow Chemical Company, The
E. I. du Pont de Nemours & Company
Dura Company
Dura-Chrome of Chicago, Inc.
Eastman Kodak Company
Eaton-Clark Company
Eaton Manufacturing Company
Electric Auto-Lite Company, The
Electrolux Corporation
Electrolux (Canada), Limited
Ellmore Silver Company, Inc.
Empire Electro Plating Supplies Corp.
Enthone, Inc.
Erie Plating Company
Federal Mogul Corporation
Federal Telecommunication Laboratories
John H. Feeley
Flour City Ornamental Iron Company
Ford Motor Company
Formax Manufacturing Company
Frigidaire Division, General Motors Corporation
E. R. Frost Company
Gemex Company
General Chemical Company

General Electric Company
General Motors Corporation
Gerity-Adrian Manufacturing Company
Gordon Manufacturing Company, The
Gorham Manufacturing Company
Graham Plating Works
Great Lakes Plating Company

Frederick Gumm Chemical Company

Hamilton Watch Company
Hammond Machinery Builders, Inc.
A. H. Hannon
Hanson-Van Winkle-Munning Company
Harshaw Chemical Company, The
Haviland Products Company
Heil Process Equipment Corporation
Hodecker Brothers
Hohman Plating Company
Houdaille-Hershey Corporation
Hub Plating Works
Hudson Motor Car Company
Hunter Pressed Steel Company
Hy-Grade Plating Company
Industrial Filter and Pump Manufacturing Company
International Business Machines Corporation
International Nickel Company, The
International Silver Company

F. L. Jacobs Company

Kelite Products, Inc.
Kelly Plating Company, The
Kings Electroplating Company
Knape & Vogt Manufacturing Company
Kocour Company
Kohler Company
Kollsman Instrument Division, Square D Company
Kuehne Manufacturing Company

Lasalco Inc.
Lea Manufacturing Company, The
Leeds & Northrup Company
Chas. F. L'Hommedieu & Sons Company
Lionel Corporation

Maas & Waldstein Company
W. D. MacDermid Chemical Company
MacDermid Incorporated
P. R. Mallory & Company, Inc.
Manderscheid Company, The
Matchless Metal Polish Company, The
Mattatuck Manufacturing Company
Maxson Company
McGean Chemical Company, The
McKinney Manufacturing Company
Meaker Company, The
Mechanical Plating Company
J. E. Mergott Company
Metal Finishers, Inc.
Metal Industry Publishing Company
Metal Mouldings Corporation
Metal Process Corporation
Michigan Bumper Corporation
J. C. Miller
Minneapolis-Honeywell Regulator Company
Mitchell-Bradford Chemical Company, The
Modern Plating Company, The
Moore Drop Forging Company
Motor Products Corporation
Munning & Munning, Inc.
Mutual Chemical Company of America

George L. Nankervis Company
Nash-Kelvinator Corporation
National Aniline Division, Allied Chemical & Dye Corporation
National Brass Company
National Cash Register Company, The
National Lock Company
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(*Continued from MAY Issue*)

Bent Cathode Tests on Throwing Power

Baths No. 25–10 and No. 50–10 were studied with the bent cathode test. For comparison, a standard Rochelle copper cyanide bath, and two fluoborate baths were used§. The fluoborate baths contained 60 and 120 g/l copper, respectively. They were prepared by dilution of a copper fluoborate concentrate. The *p*H of the 60 g/l copper bath was adjusted with fluoboric acid to 1.2, and that of the 120 g/l copper bath to 0.5, which is recommended practice. The form and dimensions of the bent cathodes are shown in Fig. 7. They were cleaned in the same manner as the panels for the performance studies and were plated in such a position that the recessed portion faced the anode (anode opposite face E and *only one anode was used*). The distance between anode face and panel face at the solution level was fixed at 1½ inch. The current density was calculated on the area of the one side of the panel facing the anode. All plates were made at 150° F with a 2-inch reciprocating movement, 32 cycles per minute.

The current densities for the plates from baths No. 25–10 and No. 50–10 were 60 and 200 asf, respectively. The same current

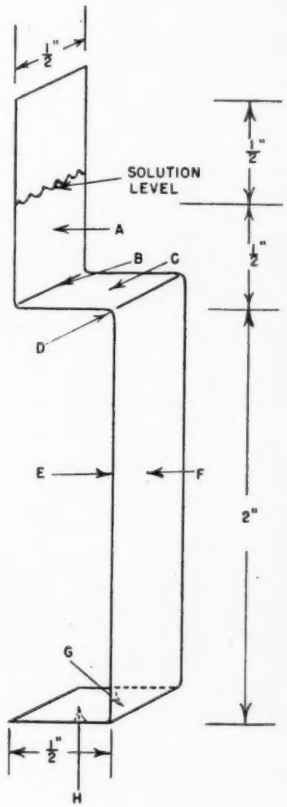

Fig. 7. Bent-cathode design and dimensions for plating tests

§*Monthly Rev. Am. Electroplaters' Soc.* 33, 923 (1946).

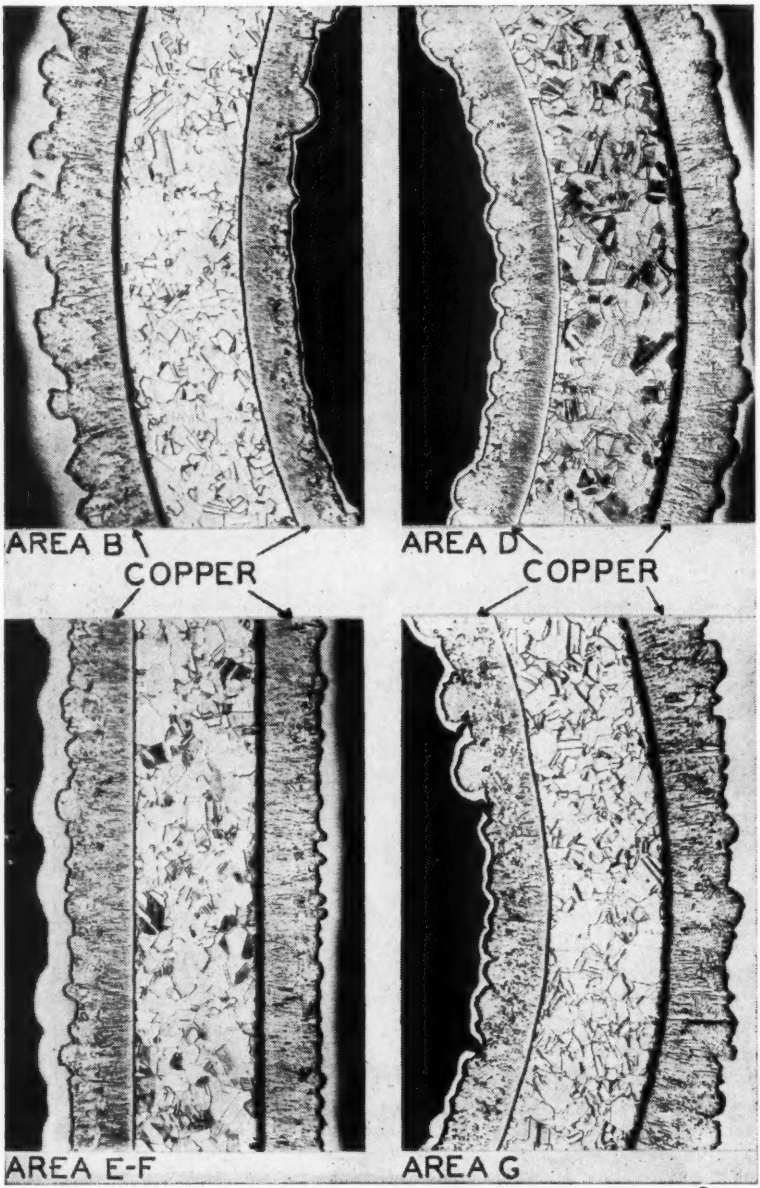

Fig. 8. Rochelle copper plate obtained at 40 asf, 150° F. X100 reduced to X66

densities were used for the fluoborate baths containing 60 and 120 g/l copper, respectively. The plate from the cyanide bath was made at 40 asf. Sufficient time of plating was allowed to produce, approximately, a 0.010 inch thick plate.

After copper plating, all bent cathodes were given a 0.002 to 0.003 inch nickel plate

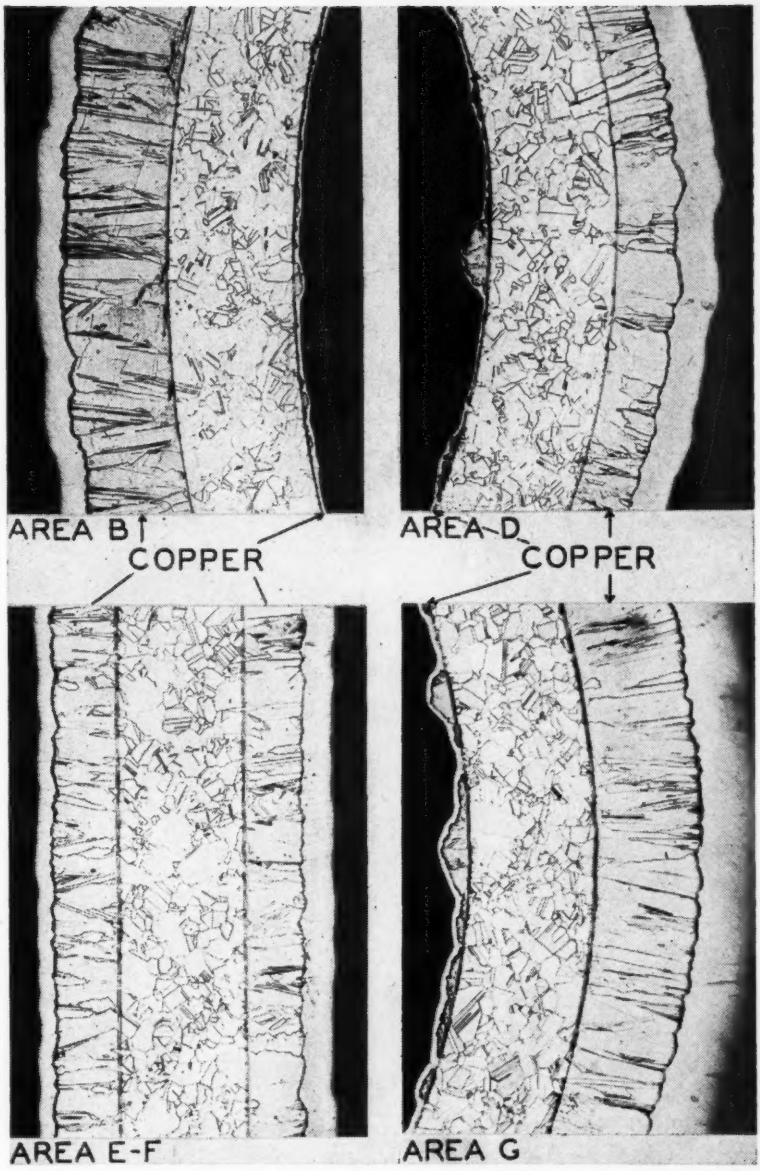

Fig. 9. Fluoborate copper plate from bath containing 60 g/l copper at 60 asf, 150° F. X100 reduced to X66

in a Watts nickel bath. The cathodes were then cut down the center line of the width. The areas to be examined were cut from one portion of the split cathode, mounted, and processed for photomicrography.

Final lapping was done with alumina on blue serge. The specimens were etched by swabbing with hydrogen peroxide–am-

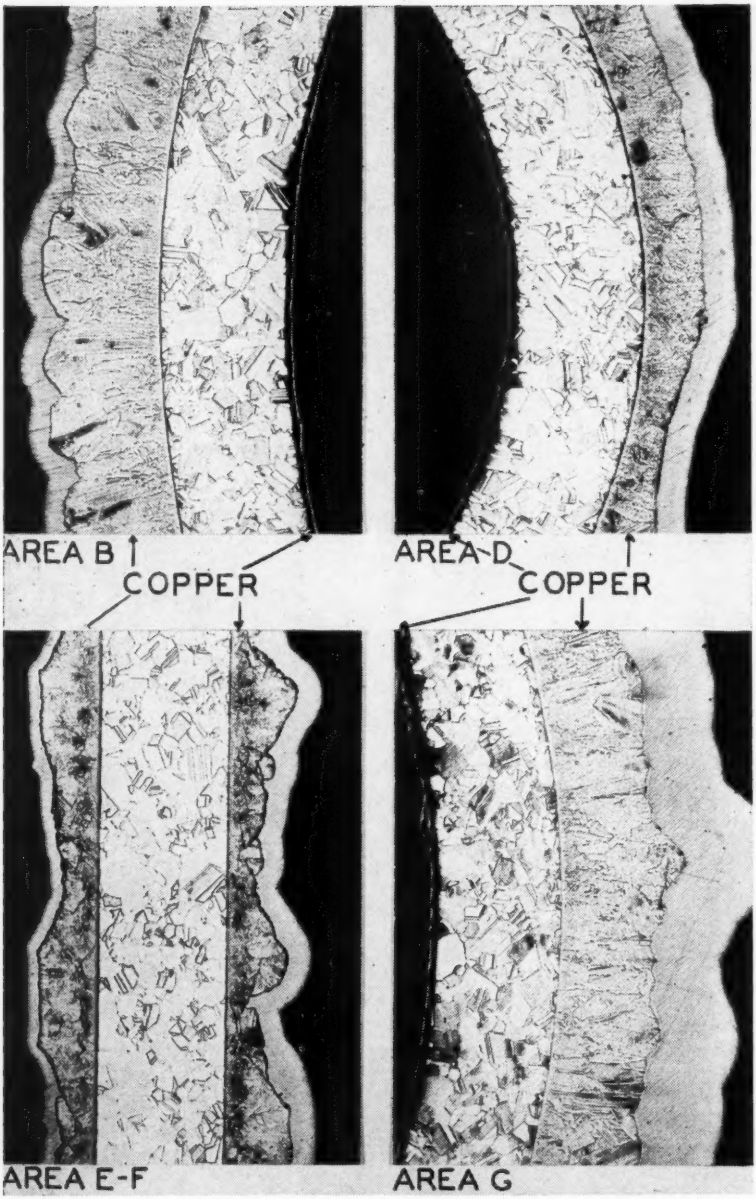

Fig. 10. Alkanesulfonate copper plate from bath No. 2510 at 60 asf, 150° F. X100 reduced to X66

monium hydroxide solution, approximately 10 per cent by volume.

The areas photomicrographed were B, D, E–F, and G in Fig. 7. The prints are shown in Figs. 8–12, inclusive. The anodes were positioned on the left-hand side of the section as shown. The outside, white portion on each photograph is nickel plate which

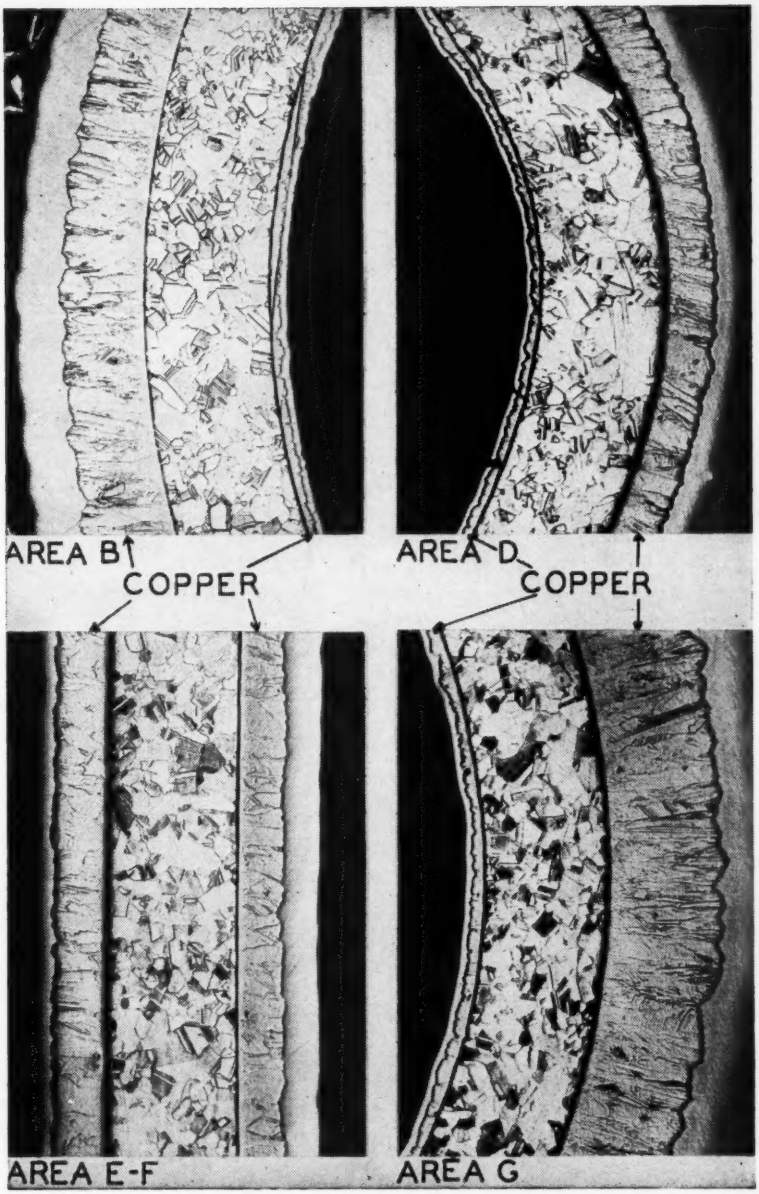

Fig. 11. Fluoborate copper plate from bath containing 120 g/l copper at 200 asf, 150° F. X100 reduced to X66

served as a backing material to prevent rounding the copper during polishing.

These photomicrographs reveal the relative throwing power of the five baths and the grain size of the deposits. An examination reveals that the copper alkanesulfonate bath does not have exceptional throwing power; there is little choice between the

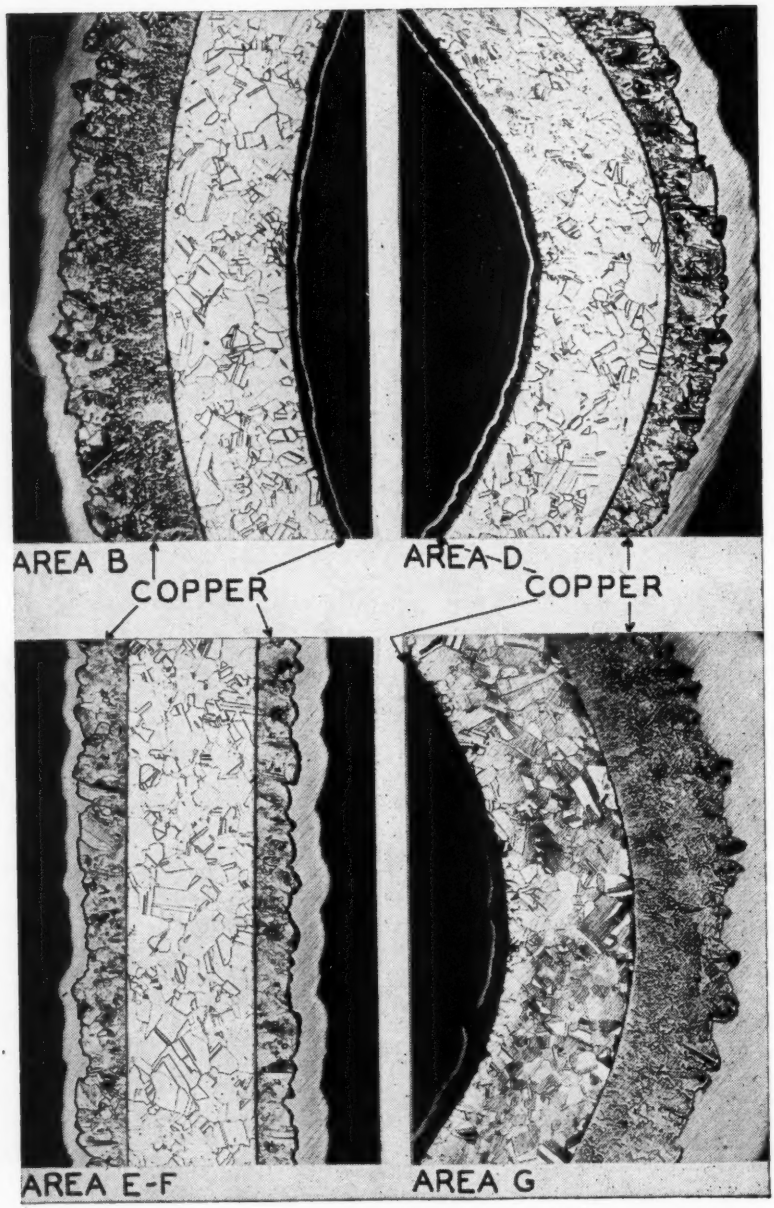

Fig. 12. Alkanesulfonate copper plate from bath No. 50-10 at 200 asf, 150° F. X100 reduced to X66

sulfonate and fluoborate baths, and the throwing power of neither approaches that exhibited by the cyanide bath.

Grain Size of the Copper Plate

The grain size of the plates from the sulfonate baths is much smaller than of those

from sulfate and fluoborate baths and approaches the fineness exhibited by the plate from the cyanide bath. However, after a thickness of approximately 0.003 to 0.005 nch is exceeded, the plates from the sulfonate baths begin to show coarser grains.

Another striking feature of the sulfonate plates is the absence of the columnar structure associated with acid baths. This columnar structure is easily seen in plate from sulfate and fluoborate baths. The grains in the plates from the sulfonate baths are distributed at random, giving rise to many slip planes. This may account for the "cry" of these plates when bent. There was very little tendency for the grains in the plate to continue the crystals in the brass basis metal. In sharp contrast are the plates from the other acid baths where the grains are oriented perpendicular to the basis metal and clearly continue the basis metal grains.

Anode Behavior

Electrolytic copper anodes were used in all the work. Other types have not been tested. A fine, reddish-brown sludge is formed on the anodes during plating. If the bath is not agitated, and if plates of the order of 0.001 inch are made, it may not be necessary to bag the anodes. However, solution agitation dislodges the sludge and may give rise to nodular plates, especially if they are heavy. Also, the sludge falls into the bath whenever the anode is moved or lifted from the bath. Therefore, it is recommended that the anodes be bagged. In this work, duck canvas bags have been used, but any acid-resisting, closely woven material should be satisfactory. The amount of sludge appears to decrease as the anode current density is increased. (See Results of Life Test below.) There was less sludge formed than in a copper sulfate bath and slightly more than in a fluoborate bath. The sludge formation in fluoborate baths increases with an increase in current density instead of decreasing as in the case of sulfonate baths.

Effect of Iron and Lead Impurities

These metals are contaminants which commonly enter copper plating baths in commercial use. Addition of 25 g/l iron reduced the limiting current density and caused the plates to show striations. Otherwise, no ill effects were noticed.

The addition of 5 g/l lead produced the same effects as iron: the plates were striated, and the limiting current density was reduced.

It may be concluded that iron and lead impurities have no seriously deleterious effects upon the plate, nor do they make the bath inoperable. The ill effects are similar to those caused by an excess of free acid.

Cell Voltage Comparison for Copper Alkanesulfonic Acid and Copper Fluoborate Baths

Figs. 13 to 15 present the cell voltages for copper alkanesulfonate and copper fluoborate baths. These data were obtained in exactly the same cells under comparable conditions. The voltages are a rough measure of the relative conductivities of the two baths. The fluoborate bath was chosen because of all copper baths its operating characteristics are most like those of the alkanesulfonate bath. Under comparable conditions, the fluoborate bath has lower cell voltage, i.e., higher conductivity. The difference in voltage or conductivity increases as the current density is increased. For instance, at 60 asf the cell voltages for the sulfonate and fluoborate baths are 1.5 and 0.6, respectively. At 300 asf they are 6 and 2, respectively. This disparity in cell voltage or conductivity is not a serious disadvantage of the sulfonate bath in view of other operational characteristics.

pH vs Free Acid Content of Sulfonate Baths

For bath No. 25–10, the *p*H limits are 1.5 and 1.2 at a free acid content of between 5 and 10 g/l. Similarly, for bath No. 50–10, the *p*H limits are 1.4 and 1.0, and for bath No. 100–10, 1.3 and 1.0. There appears to be no direct correlation between *p*H and free acid content. Hence, for reliable control, the analytical procedure must be used.

LIFE TEST ON COPPER ALKANESULFONATE BATH

Experimental Procedure

About five liters each of baths No. 25–10

and No. 50–10 were prepared in the standard manner, and 2.6 liters of each were placed in a three-liter beaker for the life study. Another 2.6-liter portion of bath No. 25–10 was used for a study of the effect of raw acid additions. A stock solution containing approximately 40 g/l copper and 255 g/l free acid was also prepared by the standard procedure. This solution was to be used for acid fortification in the two life test baths so that only chemically and electrolytically purified materials would be employed in these baths. The effect of raw acid for fortification could be evaluated simultaneously in the other bath. This was necessary because the results relate to methods for manufacturing the acid. Thus, the test would show the proper means for making bath corrections with currently available acid.

All baths were run in series at 150° F with a current of 5 amperes. The current density of 60 asf in the No. 25–10 baths was obtained by using as cathode a 1 x 6 inch (submerged) soft brass panel. The 200 asf current density in the No. 50–10 bath was obtained with a 1 x 1.8 inch (submerged) panel.

The panels were cleaned in the same manner as the panels for the performance studies.

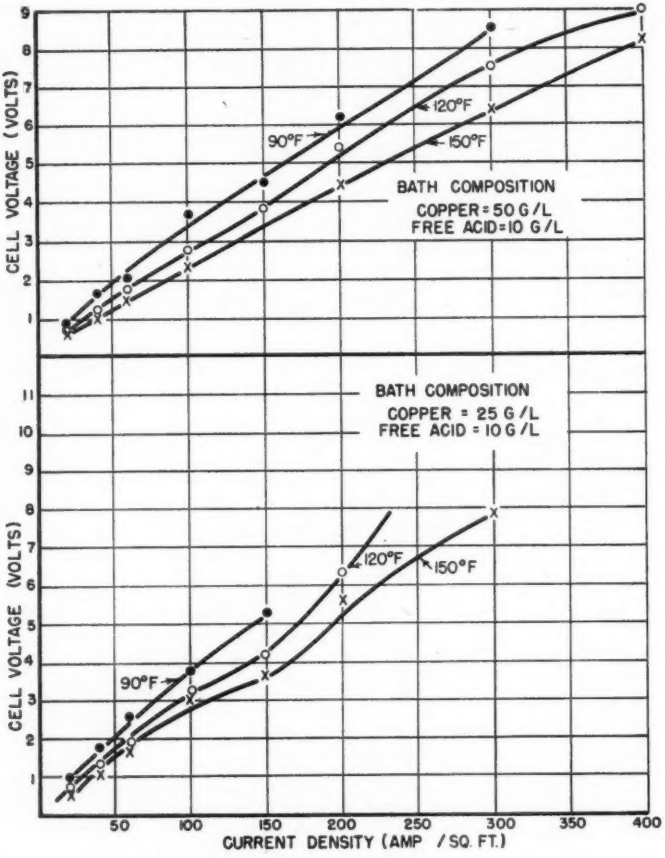

Fig. 13. Cell voltage vs. current density in copper alkanesulfonate baths

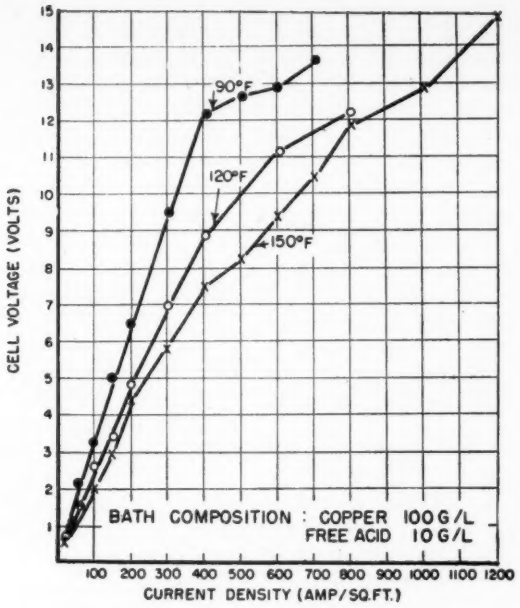

Fig. 14. Cell voltage vs. current density in copper alkanesulfonate bath

The work bar movement was a 2-inch stroke, 32 cycles per minute. The current consumed was measured with a Sangamo ampere-minute meter reading to 2 ampere-minutes. Two anodes each measuring 2 x 6 inches (submerged) were placed on each side of the cathode in the No. 25–10 baths. Two anodes each measuring 2 x 1.8 inches (submerged) were placed on each side of the cathode in bath No. 50–10. The anodes were weighed before and after the test. They were bagged in duck canvas. The sludge collected in the bags was weighed at the end of the test.

Approximately 25 to 30 amp-hr/l was passed through the bath before the free acid was reduced to 5 g/l. This required two 8-hour days of plating. Thus, two heavy plates could be obtained from the bath before correction was necessary. In this manner, any aging effects could be easily noticed.

When the free acid of the baths had been

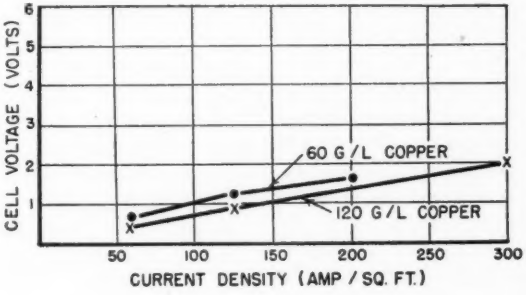

Fig. 15. Cell voltage vs. current density in copper fluoborate baths at 150° F

reduced to approximately 5 g/l, the plating was stopped, and the baths were analyzed. Any precipitate was removed by filtration of the cold bath through activated carbon. If the baths were clear, they were not filtered.

From the analysis of the bath was calculated the correct quantity of stock solution or raw acid necessary to adjust the bath back to its original concentrations. A definite, calculated quantity of the bath was removed and the calculated quantity of stock solution or raw acid was added, as the case may be. The bath was then diluted to volume with distilled water and another run made.

With plate thicknesses of 0.010 inch, the bath to which raw acid had been added appeared to produce coatings of poorer quality. This effect was corrected by an activated carbon treatment which, therefore, was used during the remainder of the test after every acid addition.

All evaporation losses were compensated for by additions of hot distilled water.

A glass rod attached to the work bar was submerged in each bath to provide gentle agitation and to prevent excessive stratification of the solution.

Extreme caution was exercised in handling the solutions so that spillage and drag-out losses were practically negligible during the test. The anodes were allowed to drain completely into the bath before removal. All containers used during filtration and correction were washed, and the washings returned to the bath.

At the end of the test of 100 amp-hr/l, separate weighed panels were plated for one-half hour and reweighed to provide the cathode efficiency.

The loss in weight of the anodes less the weight of the sludge was used to calculate the average anode efficiency over the whole test. The sludge was washed from the bags and weighed. It appeared to be finely divided copper.

Results of Life Tests

The plates referred to in this section were 0.020 to 0.040 inch thick.

Those from the two baths No. 25–10 were similar in appearance. They were coarse grained and smooth. Examination with a hand lens revealed that they were composed of small *rounded* nodules. The plates were fairly ductile, but those from the bath corrected with raw acid were always less ductile, cracks appearing on bending.

The plates from bath No. 50–10 were finer grained and smooth, with small *sharp* nodules observed through the hand lens. All of these plates cracked on bending.

Thick plates from all baths treed badly around the edges. Thin plates had a good bead, but on reaching a thickness of about 0.003 to 0.005 inch, they showed trees beginning to form.

Anode and Cathode Efficiencies

The anode efficiency for the whole period of the life tests was 98.5 per cent. All the anodes corroded very well. Anode current densities up to 300 to 400 asf may be used.

The amount of anode sludge decreased as the anode current density was increased. In bath No. 25–10, at an anode current density of 30 asf, the amount was 26.5 mg/amp-hr. In bath No. 50–10, where the anode current density started at 100 asf and may have reached 200 to 400 asf due to a decrease in anode size, 1.9 mg/amp-hr was noted. Although the results were obtained from two different baths and may have been influenced by copper concentration, the same trend was noted in the preliminary studies.

Miscellaneous Observations

A yellowish-green precipitate formed in all the baths during the initial part of the life test. Its formation seemed to be connected with the "dummying" period necessary before good plates were obtained. After the "dummying" period, no more precipitate formed and the bath remained clear for the remainder of the test. Also, the plates attained their best characteristics after the precipitate had stopped forming.

From these observations, it may be possible to reduce the "dummying" period of the No. 25–10 bath from 12 to 6 amp-hr/l since the precipitate stopped forming after that period. The No. 50–10 bath required the

full 12 amp-hr/l period. Apparently the "dummying" period depends upon the copper concentration or the amount of acid used in preparing the bath. An increased amount of acid requires more "dummying". Hence, bath No. 100–10 may require more than 12 amp-hr/l for best results. This point can be investigated as the need arises in the special cases for which bath No. 100–10 may be required.

Apparently, the small amount of precipitate formed during the "dummying" period has no effect upon plate appearance and may be left in the bath. Since all plating baths are filtered frequently, in some cases continuously, the precipitate will be removed after a short time.

GENERAL DISCUSSION AND CONCLUSIONS

The study of the copper alkanesulfonic acid plating baths has covered a sufficient number of the variables to permit an analysis of the practicability of the process. The copper fluoborate bath is the bath most comparable with the alkanesulfonic bath.

From the experimental data presented here, it is found that the copper alkanesulfonic acid baths have a number of characteristics that add to and others that detract from the commercial potentialities of the process. These characteristics and their possible effects are as follows:

1. For a simple bath, the range of operating conditions is wide—a definite advantage over other copper plating baths.

2. Fine-grained, smooth plates of good color and ductility up to 0.005 inch in thickness are obtained without the use of addition agents. Thicker plates gradually become slightly coarser grained with heavy treeing around the edges.

3. The plate has a crystal structure that tends to ignore the structure of the basis metal. A plate having this characteristic is advantageous for covering surface defects in the basis metal.

4. An exceptionally wide anode current density range is available. High anode current densities reduce anode sludge formation. At low anode current densities, the sludge formation is comparable to that in other acid copper baths. The unlimited anode current density permits high amperage per gallon which reduces the size of an installation required for a given production.

5. High cathode current densities are attainable at low agitation rates. A change to high speed plating is, therefore, aided by the fact that no additional agitation equipment would be needed.

6. For the attainable current densities, the concentrations of both metal and acid are lower than in the fluoborate bath. This is another possible cost advantage.

7. The throwing power is as good as, or better than, that of other acid baths. Apparently the bath has inherent bright plating characteristics.

8. The operating voltage is higher than that required by the fluoborate process. This higher requirement may be counterbalanced by lower bath costs and more advantageous current density ranges.

9. A faint odor is produced which would probably require the installation of a ventilating system for large installations.

Of these nine characteristics of the alkanesulfonic acid copper plating process, one (9) might be an obstacle to industrial acceptance at the present stage of development, but that is expected to be overcome with commercial production of electroplating grade acid. Five (1, 3, 4, 5, and 6) offer practical advantages; one, (2), indicates the desirability of addition agents for some applications; and two (7 and 8) offer no handicaps or advantages.

In conclusion, a word about the commercial availability of the alkanesulfonic acids is in order. The mixed acid is available in pilot plant quantities which should permit limited commercial application. Plans for its commercial production are under way.

ACKNOWLEDGMENT

The authors gratefully acknowledge the permission of the Standard Oil Company (Indiana) and of Battelle Memorial Institute to publish this report. They appreciate the assistance received from R. J. Mernitz of Battelle in carrying out the experimental work.

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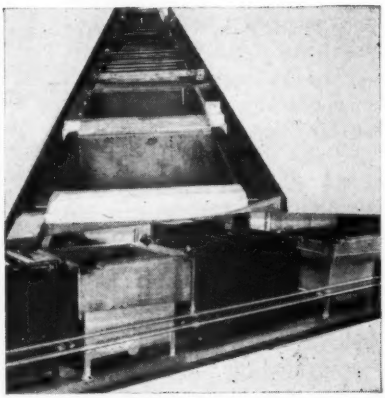

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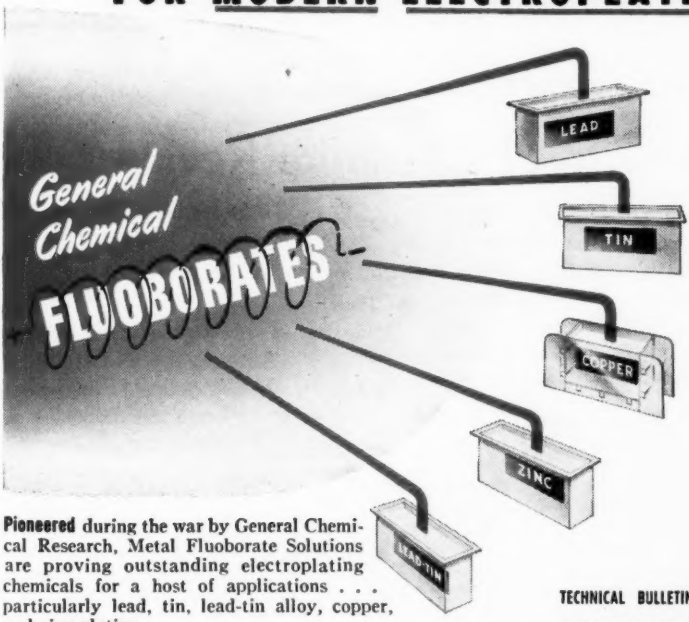

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II. Critical Literature Review

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Project Director

E. T. ADDISON, JR.
Associate

Frick Chemical Laboratory, Princeton University, Princeton, N. J.

• ● •

(*Continued from May*)

Acknowledgment is due the Research Committee, Mr. E. T. Candee, American Brass Company, Chairman; the Research Directing Sub-Committee, Dr. Richard M. Wick, Bethlehem Steel Corporation, and Dr. Louis Weisberg, Consulting Chemist, New York City, Chairman and Vice-Chairman respectively; and the Project Sub-Committee, Dr. W. A. Wesley, The International Nickel Company, Chairman, Dr. B. Egeberg, International Silver Company, and Dr. Robert M. Burns, Bell Telephone Laboratories, Inc., for their contribution to this project.

$3B_2$. Hot Water Tests

[3B2.10] This test, widely used for noble-metal deposits on iron and steel, was first introduced for *tinplate* (68). The sample is immersed for several hours in pure distilled water of permissible *p*H limits 4.5–7.0 (pink to methyl red) at a few degrees below the boiling point, generally 95° C. Rust spots appear where the coating is porous, within 6 to 8 hours on "average" to "better" tinplate. As expressed by the amount of tin detected in the solution with an analytical sensitivity of 0.00005 g/l, the test is non-destructive; there is, however, unmistakable evidence of chemical action resulting in formation of some insoluble tin oxide on the surface. Whether the reagent does or does not, depending on the *p*H, form pores in the tin coating does not seem to have been satisfactorily ascertained as yet. Unlike its behavior toward ferroxyl, the $FeSn_2$ alloy does not respond to hot water. On 28 samples of 0.0002 inch thick tinplate, pore densities from 188 to 686 pores per sq. dm. (15 to 44 per sq. in.) were observed. In a modification (187) of the test for tin on iron, the sample is washed with chromic acid, the *p*H adjusted to 4.5–5.5 with hydrogen peroxide, and the sample exposed for only 40 minutes at 95° C. A systematic hot-water porosity investigation of electrolytic tin on iron is (118).

[$3B_2$.11] The hot water test has also been applied to other cathodic-metal deposits on iron and its alloys: gold on nickel-iron; silver, copper, bronze, nickel and chromium on iron. On *gold coatings on iron-nickel alloys* (219), the test is considered safe and is said to give sharp and reliable results and to detect more pores than ferroxyl [$3B_1$.8]. For *silver on iron*, the test is described as safe (163). In a modification of the method (78), hot water is applied for 24 hours and the rust spots are then further developed by ferricyanide. In another variant (143, 181), silver deposits on iron are immersed

in hot water for 3 hours and left in cold water for another 18 hours; spots are said to be easily counted (143), and their number on comparable specimens is generally many times less than with the two-stage ferroxyl paper print method. *Nickel deposits on iron* are commonly tested in hot water; the following precautions are recommended against too high a rise in *p*H: lined containers to prevent alkalizing by dissolving glass, use of a comparison sample of porous tinplate to make sure of the pore-revealing efficacy of the water. Parallel hot water tests on *deposits of bronze* and of nickel (96) of same thickness gave for the latter from 50 to 200 times higher pore counts. In this connection, it is noteworthy that (224) hot water of *p*H 5 was found to produce severe perforations in 0.012 mm (0.0005 inch) thick electrolytic nickel foil in one hour; with same exposure, hot water of *p*H 6.9 had no detrimental effect. It means that the *p*H limits originally set (68) are much too wide; at least for nickel, only very nearly neutral hot water is unobjectionable, and it still remains to be seen whether the test will prove efficient at so high a *p*H. Since the test involves several hours' exposure, corrosion experiments will also have to be extended over several hours; similar checks on silver, copper and tin foils are imperative. At this stage, owing to the finding in (224), the hot water test cannot as yet be considered unconditionally permissible; its results can only be appraised if the *p*H is rigorously controlled and non-destructiveness under the given conditions has been directly demonstrated.

3B$_3$. Further Tests for Cathodic Metal Deposits

[3B$_3$.12] A solution originally (20) recommended for *zinc and cadmium coatings on iron*, containing, per liter, 140 cc of 3 per cent hydrogen peroxide and 20 g glacial acetic acid and maintained at 95° C, was applied (Baker in discussion, 19) to deposits of *nickel on iron*. Rust spots were developed in one hour; addition of sodium chloride accelerates the reaction. From the fact that no acceleration resulted from anodic application of current with current densities varied from one to threefold, it was concluded that nickel is not attacked and therefore the method constitutes a true porosity test. On the face of it, this deduction sounds plausible but needs more direct confirmation.

[3B$_3$.13] For testing the porosity of *chromium deposits*, a special method referred to as the Dubpernell test has been described (35) and subsequently used quite extensively (43, 57, 64, 65, 198 bis, 220). In the first description, the sample is made cathode in a solution 1.6N in copper sulfate and 1.6N in sulfuric acid at a current density of 3 asf for one minute, dipped in water, and dried in an oven. Owing to the passivity of the chromium*, copper is only deposited at discontinuities of the coating where the base metal is bare. Pores are marked by spotwise copper deposits. Rather than specify the current density, the exposed surface area being unknown, (43) recommends 0.1 to 0.2 volts at 5 cm electrode distance for 2 minutes in a solution of 200 g/l copper sulfate, 75 g/l sulfuric acid; after completion of the test, the chromium deposit (on nickel) can be dissolved in dilute hydrochloric acid and the copper spots examined under the microscope at a 60-fold magnification. Instead of counting spots, (57) employs a constant voltage and records the current density which is taken to be proportional to the total exposed pore area; this mode of reading gives, of course, only an indication of total porosity and relates the method to those of class [3C]; it also renders it applicable to deposits of chromium on copper. Since the Dubpernell test involves no anodic but rather cathodic exposure and hence is safely non-destructive for the chromium, the demonstration of porosity in chromium deposits is fully conclusive; along with [3B$_1$.9], this test can be counted as one more proof of existence of porosity in electrodeposited metals. It is not clear yet from published data what type of pores are revealed by the method or how the pattern depends on composition of the electrolyte, voltage and time. Development

*Cleaning involving mechanical action is prohibited inasmuch as it may reactivate the chromium surface.

into a micro-method (43) is an interesting possibility.

[3B$_3$.14] A testing method for *chromium and nickel deposits* closely related to the Dubpernell test uses no external source of current but deposits the copper by displacement on immersion (82, 113) in an acid copper sulfate solution. *Chromium deposits on zinc* with and without intermediate layers of nickel, copper, and nickel over copper and *nickel deposits on zinc* were immersed (82, 83) in a solution of 49 g/l sulfuric acid, 10 g/l crystalline copper sulfate for 30 seconds, and the copper spots were developed in hydrogen sulfide; detection of small pores by this method is said to be difficult and erratic. Use of a similar method, immersion in a solution of 40 g/l copper sulfate, 10 cc/l concentrated sulfuric acid (sp. gr. 1.84), was reported for deposits of nickel or cobalt on iron (111).

[3B$_3$.15] In another porosity test for deposits of *nickel, cobalt, chromium and tin on iron*, called the salt-peroxide test (26 bis), the sample is immersed for 4 hours in a solution containing, per liter, 5.8 g NaCl and 3 cc of 3.6 per cent hydrogen peroxide. Large pores are revealed as rust spots within 30 minutes. Smaller pores in nickel and cobalt deposits appear after 2 hours (111). The solution is said not to attack nickel (26 bis).

[3B$_3$.16] A novel testing solution to be referred to as the ferroferricyanide reagent was introduced (52) for such metal deposits on copper or copper alloys which are cathodic to copper in aerated sodium chloride solutions and assumed to be so in a solution containing, per liter, 60 g NaCl, 10 g ferricyanide, 10 g ferrocyanide. As constant supply of oxygen is considered essential in this test, it is carried out in shallow vessels or else with paper soaked for 30 minutes, dried and stored in the dark, and remoistened when used. Pores are indicated by brown spots. A more dilute reagent (83), 10 g/l NaCl, 1 g/l ferricyanide, 1 g/l ferrocyanide, also produces brown spots in *nickel on copper*. Data are too scarce to warrant appraisal; exact knowledge of the relative polarity of nickel and copper in the reagent, of its dependence on various factors and possible change with time, and of the degree of its corrosiveness for nickel is yet to be gained.

[3B$_3$.17] The same applies to two other reagent compositions also proposed for the *nickel-on-copper* combination (69) and containing oxidizers so as to render the nickel passive. On immersion of nickel on copper for a few seconds in a solution containing, per liter, 5 g ferricyanide, 5 g permanganate, 1 g mercurous sulfate, 100 cc concentrated sulfuric acid, defective areas in the nickel cause mercury to deposit with copper going into solution as cupric ferrocyanide, and red-brown spots appear. On 1-minute immersion in, per liter, 5 g ferricyanide, 5 g dichromate, 1 g potassium iodide, 1 g mercuric chloride, 150 cc concentrated hydrochloric acid, discontinuities in *nickel on brass* become coated with mercury while red-brown spots are said to appear with *nickel on copper*. The reactions involved are not quite clear.

[3B$_3$.18] For deposits of *chromium on copper and brass* a ferrocyanide test (43, 113) is reported which employs immersion in a solution containing, per liter, 2 g ferrocyanide and 100 cc concentrated nitric acid for 15 minutes; red spots denote pores. Dilute hydrochloric acid has also been suggested (33). With chromium on brass, porosity testing by dipping in nitric acid (74) is said to be unsatisfactory and give only rough indications. The "ammonia service test" (220), consisting in exposure to aqueous ammonia fumes for 4 to 24 hours and resulting in spotwise lifting of the plate, is likewise only a rough indication.

[3B$_3$.19] A ferroferricyanide gel [3B$_3$.16] was used (163) for testing the porosity of *silver deposits on copper;* the solution, 5 g/l ferricyanide, 0.5 g/l ferrocyanide, 10 g/l NaCl and 3 g/l agar, is poured over the sample for 2 minutes. Absence of attack by the reagent has not been directly demonstrated but is said to be doubtful "owing to the relative thickness of the coating, 0.0001 inch (0.0025 mm), and the relatively low temperature of 30° C". A demonstration is still due.

[3B$_3$.20] The same holds for the application of the original [3B$_3$.16] ferroferri-

cyanide reagent paper to *lead coatings on iron* (52) in which the paper is moistened before use with a 5 g/l acetic acid solution "to remove interfering corrosion products of the lead".

[3B$_3$.21] For deposits of *chromium on nickel*, testing with a 50 g/l ammonium hydroxide, 2 g/l dimethylglyoxime solution by immersion for 12 to 24 hours was recommended (43). Results are said to parallel those of the undoubtedly safe Dubpernell method [3B$_3$.13]. The main drawback of the test is its duration.

[3B$_3$.22] Porosity in deposits of *nickel on copper and brass* was also tested by immersion in a reagent made up of 700 cc ammonia of sp. gr. 0.90, 700 cc of a solution of 175 g trichloroacetic acid, and 700 cc of water (102–104, 127); the method is designated as the Frigidaire test. Porosity of the nickel is inferred from the blue coloration of the solution, hence the method might be classed under [3C]; but on a horizontally held specimen, green-blue spots appear. The reagent was found (218) to be without effect on thin electrolytic nickel foil when immersed alone but to be highly corrosive for nickel in contact with copper. The blue solution turned pink on addition of dimethylglyoxime indicating that both copper and nickel had gone into solution. Underneath the spots, the nickel deposit was found to be severely eroded. Evidently, the relative polarity of nickel and copper in this reagent does not in the least preclude attack of the nickel. The test is to be rejected.

[3B$_3$.23] The same would seem to apply to methods using hydrogen sulfide (82), alkali sulfides and polysulfides for *nickel on copper*, it having been found (218) that nickel foil in contact with a copper strip becomes covered with brown spots in sodium sulfide.

[3B$_3$.24] Chemical spot methods are particularly indicated for deposits of precious metals where probability of attack by the reagent is remote, the main concern being consistency and reproducibility of results and correlation between spot pattern and actual porosity. *Rhodium deposits* were tested (97) with nitric acid, salt spray, uric acid (from the point of view of service in jewelry), hydrogen sulfide, ammonium polysulfide. In C. H. Sample's test (140) for *gold deposits on brass*, the specimen is exposed to a mixture of air and nitric acid vapors at room temperature for several hours; pores are indicated by fine whisker-like blue protrusions. This test is said (219) to be superior to the nitric acid drop test. *Gold on nickel* is tested (179) in moist hydrogen sulfide which produces brown-black spots in several hours. For *gold on* an *iron-nickel alloy*, the hot water test (219) is preferred to ferroxyl which reveals fewer pores.

[3B$_3$.25] In this connection it should be stated that further comparative studies on deposits of precious metals, attack and corrosion by the reagents being out of the question, are apt to supply disclosures on the mechanisms of the action of various porosity reagents and, more particularly, on the all-important points (b) and (c) raised under [3A.2]; such information, vitally essential both for the appraisal of the correlation between pore patterns as revealed by various rest reagents under definite conditions and the true porosity and for determining the quantitative performance of the tests, can be expected to be gained from extensive studies on precious metal deposits. Data heretofore available are all too scant.

[3B$_3$.26] On the other end of the electrochemical series, in the newly opened field of protective deposits on light metals and alloys, there are but few mentions of porosity tests on deposits. In *zinc on aluminum*, white spots, allegedly corresponding to pores in the zinc, are said (112) to be produced by 2.5 per cent gelatin and 2.5 per cent sodium hydroxide at room temperature, by a sugar solution with 5 per cent glycerin and 30 per cent sodium hydroxide at 80° C, and by a 10 per cent sodium hydroxide solution at 70° C. These reports are only included for the sake of completeness. An impregnation method for *chromium deposits on light alloys* will be reported under [3B$_7$.41]. Porosity of *deposits on magnesium alloys* does not yet seem to have received much attention*.

*Private communication from the Dow Chemical Company.

3B$_4$. Tests for Anodic Metal Deposits

[3B$_4$.27] Unlike the deposits discussed in the foregoing paragraphs, films of less noble metals on a nobler base are supposed to protect by diverting corrosive attack from the base to the coating metal; local electromotive couples arising at pores will not automatically affect the base metal. It is fairly well agreed (72, 220) that, in contradistinction to cathodic metal deposits, moderate porosity in *zinc and* in *cadmium coatings on iron* and particularly small pores hardly promote corrosion of the base metal, and that only relatively gross discontinuities in the coating will detract from its protective value. Methods for testing the porosity of such deposits are therefore of a different nature than those listed under [3B$_1$] to [3B$_3$] which may only be active if [the base metal is anodic to the deposit. Actually, some of the methods developed for less noble deposits knowingly use reagents which do attack the deposited metal and are, as a matter of fact, based on such attack; non-destructiveness is neither claimed nor necessary, but one does need to know at what rate and to what extent the deposit is attacked by the reagent.

[3B$_4$.28] For *zinc on iron*, application of ferroxyl in the form of a 1.5 per cent agar gel, filtered and neutralized to phenolphthalein, with 7 cc of a 1 per cent ferricyanide solution per 100 cc, the sample being sandwiched between two layers of the gel, was reported (55). It is unconfirmed and very certainly wrong, as must be another application of ferroxyl to zinc (89). Likewise, the worth of such tests as application of paper impregnated with ferrocyanide and potassium chloride, which gives blue spots in 1 to 3 minutes (55), or dipping in warm dilute acetic acid and subsequent dipping in 5 per cent tannin, 1.5 per cent hydrogen peroxide (blue spots) (55) is unconfirmed. The inapplicability of ferroxyl was recognized by (7).

[3B$_4$.29] *Zinc deposits on iron* were tested (4 bis, 7) by immersion in hot concentrated sodium hydroxide which causes evolution of hydrogen bubbles at pores. When treated with 0.5 per cent sulfuric acid, zinc plate on iron goes into solution (53), the slower the thicker it is; the curve of loss of weight against thickness falls steeply at low thicknesses and levels off to a more or less constant value above a certain thickness. The dilute acid obviously attacks zinc at a substantial rate only at points where iron is accessible and a local galvanic couple can arise; diminution of porosity or, to put it alternatively, in closer agreement with the reviewers' frame of mind, diminution and practical disappearance of penetrability of the pores with increasing thickness causes the rate of solution to fall to the low constant value corresponding to non-galvanic dissolution; the test sounds convincing as a demonstration of the porosity of the zinc deposit. Immersion in a copper sulfate solution (82) makes copper deposit at discontinuities which can be further developed by hydrogen sulfide; detection of small pores by this method is said to be uncertain. Application of a solution of 20 g/l glacial acetic acid and 140 cc/l of 3 per cent hydrogen peroxide at 95° C permits (20) to evaluate porosity from the time necessary for rust spots to appear.

[3B$_4$.30] The last named method is also recommended for *cadmium on iron* (20). Ferroxyl was applied to cadmium (60) on iron even though it was conceded that cadmium is anodic to iron. On this ground, the legitimacy of using ferroxyl and the conclusion that cadmium deposits are pore-free at 0.0025 mm (0.0001 inch) were contested by (62) whose salt spray experiments showed a distinct break in the "porosity" (time of appearance of rust spots) against thickness curve at about 0.0348 mm (0.0014 inch) indicating continued (salt-spray evidenced) porosity up to that high thickness; while the latter evidence is unreliable [3B$_6$.40], porosity in cadmium on iron very certainly goes mostly unnoticed with ferroxyl which, as in the case of zinc, probably only detects large pores and is inactive at medium and small pores. Porosity of cadmium coatings was also estimated (72) by immersion in 1 per cent hydrochloric acid and observation of the rate of evolution of hydrogen bubbles formed cathodically at the iron base; their number is said not to be affected by oxygen (air) content of the

acid even though the rate of solution of cadmium in air-free 1 per cent hydrochloric acid is 0.0015 g/hour/10 sq.in. as against 0.006 in aerated acid; this may be construed as an indication of the minor role of attack of cadmium in the hydrogen-bubble test. Its results at 20° to 23° C were termed erratic (82).

[3B$_4$.31] For *tin deposits on copper*, testing by polysulfide was specified (136); the reagent is prepared by adding 250 g of flowers of sulfur to 1 liter of saturated sodium sulfide solution at 21° C, letting stand for 24 hours and diluting to a sp. gr. of 1.142 at 15.5° C; it must blacken copper in 5 seconds; the sample is immersed for 30 seconds (black spots). The case of *nickel on copper and its alloys* has been treated in the foregoing [3B$_3$.16, 17, 22, 23] under the assumption that nickel is cathodic to copper. It should be stressed again that this need not be generally valid and most certainly varies with the nature of the reagent, with time and possibly with other factors. *Chromium deposits on copper and brass* were mentioned under [3B$_3$.18].

3B$_5$. Electrographic Methods

[3B$_5$.32] A relatively recent group of methods, first proposed by (79), consists in making the sample anode in a solution containing a substance which on reacting with the base metal will give a colored product at pores but which will not react with the deposit. In order that the method be correct, it is required and should be checked directly in each particular case, that the anodic exposure does not cause pores to be formed in the deposit where none existed originally. This danger is very real and does not seem to have been given the full attention it deserves; from industrial laboratory quarters (223) it is pointed out that even in tests of short duration new pores in the coating may be opened up; in many cases, the required absence of perforating attack on anodic exposure of the deposit has been assumed but not demonstrated compellingly enough and will have to be checked anew. The method can be applied (90) through a layer or a wad of paper impregnated with the reagent and pressed between the anodic plated sample and a suitable cathode such as aluminum. Since the pore pattern is printed and recorded on the paper, the methods are called electrographic. Manifold techniques and accessories to the method have been devised and described (215) including presses, reagent papers, pliable cathodes of rubber sponge and thin aluminum foil for use on curved surfaces*. Electrographic methods clearly enjoy ever-increasing popularity.

[3B$_5$.33] Main applications of these methods are to deposits of nobler metals on a less noble base. The voltage required is about 3 volts. *Gold deposits on copper* in ferrocyanide give brown spots and so do *silver deposits on copper* (79, 90). *Gold on bronze* is tested with ferricyanide or with ammonium phosphomolybdate, *gold on tin* with phosphomolybdate: both give blue spots (79, 90). Pores in *gold, platinum, and iridium deposits on molybdenum* were detected with potassium bisulfate and subsequently developing the paper with ferrocyanide: dark brown spots result (219). For *tin deposits on brass*, the paper was impregnated with antimony sulfide and moistened with a phosphoric acid solution (219): copper displaces the antimony and forms dark brown spots of copper sulfide. For *gold deposits on nickel*, a procedure is described (179) in which an agar gel is used instead of paper; the electrolyte, which is prepared by dissolving 3 g agar, 6 g sodium chloride in 100 cc of water, making ammoniacal and adding 10 cc of a half-saturated solution of dimethylglyoxime, is poured over the sample and allowed to gel; contact with the platinum wire cathode is made through a saturated sodium chloride solution poured over the gel; with 6 volts, 5 to 10 milliamp/sq.cm., small red spots appear in 5 to 10 seconds where nickel is exposed. A dimethylglyoxime reagent also detects pores in *chromium on nickel* (pink) and in *copper on iron* (deep cherry red) (79). *Tin on iron* was tested with ferri-

*Aluminum dies reproducing the shape of the work are another alternative which is recommended for serial routine inspection of articles manufactured in large numbers.

cyanide (79); the paper print method (90) uses a 5 to 10 per cent ferricyanide solution at 3 volts and produces blue spots. For *tin on lead*, a 50 g/l ammonium acetate, 10 g/l potassium chromate electrolyte was recommended at 3.5 to 3.6 volts with the specimen in horizontal position (137); lead gives yellow spots while the tin is said to remain passive through formation of a tin oxide film. Electrographic porosity tests of *lead* deposited *on brass* have been reported (219).

[3B$_5$.34] For *nickel coatings on copper and brass*, the following (not elsewhere published) electrographic method was recommended (198 bis): paper is moistened with a 5 per cent solution of sodium nitrate and applied over the sample surface, a sheet of platinum, lead or nickel serves as cathode, and a current of 30 milliamp/sq.dm. is passed for 3 minutes. The paper is developed for a minute in a solution of 50 g/l ferrocyanide, 30 cc/l glacial acetic acid; pores appear as brown spots. Instead of the ferrocyanide developer, a 1 per cent alcoholic solution of rubeanic acid (dithiooxamide) with 50 cc/l acetic acid may be used; it produces bluish black spots and is somewhat more sensitive.

[3B$_5$.35] An interesting variant of the electrographic method using ac instead of dc in a sodium chloride electrolyte was communicated (221) for *nickel deposits on steel*. Rust spots appeared in 5 to 10 minutes but did not increase in size with longer treatment. The pores were made visible if a small amount of hydrogen peroxide were added to the sodium chloride solution in order to oxidize the iron as soon as it leached out through the pores. To the reviewers, this method seems to be quite closely related to the modified—and unobjectionalbe—two-stage paper print method (154) in [3B$_1$.7]; here and there, the nickel on iron only comes in contact with sodium chloride. With the obvious supplementary direct check on non-corrosiveness of ac in sodium chloride to nickel foil—which can almost certainly be expected to be confirmatory—the test can be added to the as yet limited number of ironclad demonstrations of porosity. Further development of ac electrographic methods and study of their possible dependence on frequency and current density is highly desirable.

[3B$_5$.36] To a limited extent, electrographic dc methods were also used for anodic metal deposits on a nobler base; the mechanism of the action is not quite clear. According to (90), this generally requires higher voltages, up to 12 volts. However, *zinc and cadmium deposits on steel* were tested (82) anodically in a half-normal sodium hydrosulfide solution at 25° C for 5 minutes under 6 volts; black iron sulfide is produced at pores while zinc and cadmium are said to remain passive (221). *Zinc coatings on iron* were also tested electrographically at less than 4 volts in a solution of 20 g ferrocyanide, 1 g magnesium sulfate, 500 cc water (89), said to be "least corrosive" for zinc; current density and distance of electrodes allegedly are unimportant; pores are indicated by gas bubbles which cease to evolve when the deposit is covered by a blue deposit; it is claimed that very small pores can be detected in this way. Electrographic testing of zinc deposits on iron with ferricyanide has also been reported (109).

3B$_6$. Salt Spray Test

[3B$_6$.37] On the assumption that attack by corrosive agents on electroplated metals takes place at pores and not at sound parts of the deposit, salt spray has been quite commonly considered to be a porosity testing reagent and used as such extensively on deposits of *nickel and chromium on iron*. The conviction that rust spots developed in the salt spray reflect the porosity of the coating was based on the observed parallelism between the effects of the early and corrosive ferroxyl reagent and the salt spray provided the latter test was prolonged for at least 100 hours (19), there being no such correlation with the effect of short (a few hours') salt spray exposures; this finding has since been repeatedly confirmed (51, 75, 129). Hence, the conclusion was drawn (19) that salt spray, same as ferroxyl, is actually a porosity test, the only difference being that it requires at least 100 hours to give the same indication as a few minutes' ferroxyl test. But this attractive conclusion falls with the realization that the ferroxyl

on which the judgment was based is concededly corrosive for nickel [3B1.4, 5, 7]; hence, the 100 hours' salt spray, the results of which were repeatedly found to meet those of ferroxyl, must by the same token be equally corrosive. Actually there is some evidence for it. Attack of nickel by salt spray was variously reported (Baker in discussion, 19; 186; 214 bis): after 200 hours, loss of weight was relatively slight, namely, 0.002 g/sq.dm. for dull and 0.0076 for bright electrolytic nickel foil; however, both foils developed numerous fine pinholes at the end of the test (186). Severe perforations developed in electrolytic bright nickel in 50 hours' salt spray (214 bis), but dull nickel remained practically unaffected on exposures of 100 hours and more. In other quarters, salt spray is said to have only slight dissolving effect on nickel, chromium and copper (51); this of course does not prejudge perforation. While the available evidence is sparing and somewhat conflicting, it is—pending further research along the lines indicated under [3A.5]—heavily weighted in favor of positive corrosiveness of salt spray for nickel foil as far as perforation is concerned. The original proposition (19, 51) of ferroxyl and salt spray being qualitatively similar porosity reagents is reduced to the much more modest proportions of a coincidental parallelism between two corrosion tests carried out under conditions arbitrarily so chosen as to render the two effects congruent. Classification of the 100 hours' salt spray exposure as a porosity test, let alone as a porosity measuring method, cannot be sustained, the odds at this time being heavily against it.

[3B6.38] Salt spray applied to thin *silver deposits on iron* gave rust spots too numerous to be counted (143); on thicker deposits, the number of spots was comparable but somewhat less than with the two-stage ferroxyl print method. Some silver is said to be dissolved in salt spray; consequently, perforation is very likely. In this connection it should be stressed that a lower number of spots obtained with one reagent as compared with another need not by any means indicate that the former is less corrosive; an unsuitable reagent may well open up new pores and yet fail to reveal a fraction of originally pre-existent ones. See also [3B1.8] on tin and [3B2.11] on silver. Testing *deposits of manganese* with salt spray is reported (203).

[3B6.39] Application of salt spray to deposits of *chromium on brass* is reported (183) to give green and blue spots; however, there is nothing to indicate or to disprove that what was tested was porosity of the coating. Salt spray is said to be a porosity test for *nickel coatings on zinc-base die castings* (198 bis), requiring about 48 hours; that original porosity is indicated needs confirmation.

[3B6.40] As applied to *cadmium deposits on steel*, salt spray indicated a porosity very much higher than that found with ferroxyl; while the latter is evidently unsuitable for cadmium on iron [3B4.30], prolonged salt spray is reported to be destructive for cadmium. The view that it does not measure initial porosity of cadmium and *zinc deposits*, inasmuch as "potential pores", not originally porous, are opened up in the spray, has also been expressed (194).

3B7. Impregnation Methods

[3B7.41] A few literature references mention methods whereby discontinuities and defects are impregnated with extraneous substances not produced by any reaction with either the material of the base or of the deposit and are thus rendered visible. According to (121), porosity in lead, tin, enamels, etc., is detected by first dipping in a solution A, washing—without removing A from pores—and dipping in a solution B which forms with A a colored product; thus, dyes can possibly be coupled in pores. Possibilities of application to electrodeposits have yet to be investigated. The procedure (128) produces the dye by anodic acidification; examples of suitable indicators are sodium alizarinesulfonate, triphenylrosanilinetrisulfonate, sodium salt of p-benzenesulfonic acid-azo-naphthylamine, potassium salt of p-benzenesulfonic acid-azo-benzylaniline or, generally speaking, alkali salts of azo or sulfo dyes of the aromatic series; required voltages are from 10 to 100 volts, time periods from 5 to 20 seconds; addition

of basic substances such as amines permits washing of the surface after electrolysis without leaching out the dye from the pores. While mainly applied to non-metallic coatings on light alloys, the method is shown to be usable on *chromium deposits on aluminum*. Possibilities of more general application are worth investigating. Impregnation with fluorescent products (oils), designated by such trade names as "Zyglo", "Magnaglo", and put out by the Magnaflux Corporation, is variously described as the fluorescent penetrant method (197, 206*), but the nature of the products, penetrants and developers is not disclosed. "Zyglo" is said to be mainly suitable for minutest pores, of the order of the wave length of visible light. "Magnaglo" is said to be entirely different from "Zyglo". Impregnation with radioactive products followed by contact photography in an obvious but as yet expensive possibility (218).

[$3B_7$.42] A method, more logically belonging to class [3C] inasmuch as it indicates total porosity only, consists in impregnation with paraffin and weighing (122). It seems to be applicable only to highly porous bodies, hardly to electrodeposits, and is only mentioned for the sake of completeness.

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*Applied to silver plated bearings.

(*To be continued*)

RESEARCH COMMITTEE MEETING

On March 28, 1947 the A. E. S. Research Committee held an all-day meeting at the Hotel Mayflower, Washington, D. C. The full Committee met with the exception of Dr. R. M. Wick who was unable to attend because of illness. In addition, Mr. C. H. Sample of the International Nickel Company, liaison to Committee B-8 of A. S. T. M., and Mr. William M. Tucker, new Vice-Chairman of the Research Directing Sub-Committee, were welcome guests.

It is planned to have a booth at the Industrial Finishing Exposition for the Research Committee in which various features of the Research Program will be advertised and exhibited.

Under the Research Directing Sub-Committee there are nine projects active or in the process of negotiation. Responsibility for these projects have been distributed between the two Vice-Chairmen, Dr. Louis Weisberg and Mr. William M. Tucker, who are under the immediate supervision of Dr. R. M. Wick as Chairman.

Six new appointments to Project Directing Sub-Committees are listed below:

Project No. 2: Mr. John Poor, Van der Horst Corporation

Project No. 4: Mr. A. W. Tracy, The American Brass Company

Project No. 6: Mr. A. Mendizza, Bell Telephone Laboratories, Inc.

Project No. 7: Mr. A. H. DuRose, Harshaw Chemical Company

Project No. 8: Dr. G. Dubpernell, United Chromium, Inc.

Project No. 9: Mr. N. Promisel, Bureau of Aeronautics, Navy Department

As a result of the Research Program carried out to date, twenty-eight research reports have been published, nineteen have been written and are in the process of preparation, and nineteen more are definitely scheduled.

The Committee has been discussing ways and means of obtaining more publicity for the Research Program; two comprehensive outlines on this have been submitted by Dr. H. L. Kellner and the Secretary and are now being studied by the Committee.

✝

Charles C. Chase

As this issue goes to press we are advised that Charles C. Chace of Cranston, Rhode Island, Secretary of the Providence-Attleboro Branch since 1943, died at noon of May 12.

He will be greatly missed, not only by his home Branch which he served so faithfully but also by his many friends throughout the Society.

May he rest in peace.

LIXOL

Cowles FAST ACTING
EMULSION SOLVENT CLEANER

Because LIXOL works fast and is a dependable emulsion cleaner for still tank, presoak or washing machine equipment, it is preferred for many metal cleaning operations. It can be used straight or diluted with water or kerosene.

- LIXOL penetrates
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LOW-COST PRODUCTION OF TOP-QUALITY
Silver plating

This mark on every Handy & Harman Silver Anode means that *every one* is entirely free of all impurities which can cause plating troubles and measures up to the highest standards in fineness and physical properties. To silver platers, whether in the Arts or in Industry, these qualities mean profitable plating because they avoid interruptions to production and produce uniformly highest quality plating. Try Handy & Harman 999 "PLUS" FINE Anodes and see the difference.

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82 FULTON ST., NEW YORK 7, N. Y.
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The Independence of the Branches

SOME COMMENTS

In the April issue of THE MONTHLY REVIEW there appeared an article under the above title by my good friend, George B. Hogaboom, no doubt offered as propaganda in behalf of the proposed new Constitution. While he has done much good work for the A. E. S. heretofore, this latest effort is not in that category.

In the first place, there was no well-founded reason for a new Constitution; all that was needed was the addition of the new amendments approved in Conventions of recent years, to which could have been added the increase in dues and the method of distribution. With these changes and additions, a far superior Constitution would have been provided than the one now offered for approval.

In paragraph 3 of Hogaboom's article, the last sentence concerning Honorary Members is incorrect. Under the Constitution, no Branch is allowed to elect Honorary Members; they can select and recommend a worthy member for that honor to the Supreme Society which alone can confer it. (EDITOR'S NOTE: HOGABOOM UNDOUBTEDLY REFERRED TO BRANCH HONORARY MEMBERS.)

Other arguments in the same article are also incorrect. While Branches have a certain degree of independence, yet there are certain restrictions under the Constitution, and appropriately so, which they must observe and which the National Officers have the power to enforce, and in this connection it is well and proper to point out that the statements in paragraphs 11 and 12 are incorrect.

The new Constitution takes away from the Branches the delegate system. It also deprives them of the right to handle their own financial affairs, which, in a sense at least, reduces them to the status of local assemblies merely to discuss subjects pertaining to their work or limited debating societies.

With reference to what is stated in paragraph 14, it may be true that the collection of dues is a difficult task. However, it should also be obvious that undertaking the same work by remote control, so to speak, will not improve the situation because the Branch officials, being in close touch with their members, can do an infinitely better job. It is well to point out in connection with the per capita tax on delinquent members that under the present system where Branches pay the per capita tax of delinquent members, the National Society suffers no loss, also that any claimed loss to the Branch is rather superfluous.

The statements in paragraph 15 are rather farfetched as well as inconsistent. Under the present Constitution any member six months in arrears in dues is automatically suspended and is not entitled to receive THE MONTHLY REVIEW nor the annual *Proceedings;* where this stipulation has not been enforced, again the National Society suffers no loss; therefore there is no question of reimbursement.

If the stipulation in paragraph 16 is enforced to the letter, the loss will be far greater than any possible gain. Where Branches have carried delinquent members for indefinite periods, this liberal consideration has salvaged many members who otherwise would have been lost. The chances are we will lose a certain percentage of members through the new dues set-up, and there is no conceivable reason to make the situation worse.

Paragraph 17 is glaringly illogical: If the National Society does not mean to suspend

a delinquient member and the Branch chooses to carry him along, what happens?

The subsequent paragraphs of the article reflect, for the most part, upon the delegate system under which the Society has grown so great. This success has been due to the careful scrutiny that has gone into the selection of highly qualified Officers, but such careful selection will not be possible under the ballot system proposed in the new Constitution. The same basic reasoning applies to the selection of Convention locations. Beside the expense involved in the mailing of ballots, the extra personnel made necessary in the office of the Executive Secretary, plus the expense of tellers for travel, hotel, and other incidentals would wipe out a goodly portion of the extra income of the National Society derived from the increase in dues and also affect its distribution; furthermore, the collection of the dues by by the same Office only adds to this extra expense.

Therefore, the Society is confronted with a dubious experiment at best. With the delegate system and having the Branches handle their own finances, the Society has progressed to a point where it enjoys a high standing among similar organizations if it is not the highest ranking Society in its field. Common sense dictates that the proposed new Constitution should be rejected. ERNEST LAMOUREUX.

Correction

The Hooker-Kresge Library, located at Wayne University in Detroit, the second largest university in the country, has a very complete section devoted to the art and science of electroplating.

This section, however, was not equipped by the Detroit Branch as stated in the May issue.

Job Shop Operations

The Masters' Electro-Plating Association, 123 William Street, New York City 7, in its *Monthly Bulletin* advises that the rate of operation among its members rose from 58 to 60 per cent during the month of April as compared to 61 per cent overall for March and 77 per cent for April, 1946.

DON'T THROW IT AWAY!

We pay cash on the barrel head

for one drum or a carload—or we will reclaim for your own use—

The Sludge Drawn from Your Degreasing Machine after Cleaning

TRICHLORETHYLENE OR PERCHLORETHYLENE

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or send a quart sample of the material you now discard for our proposition

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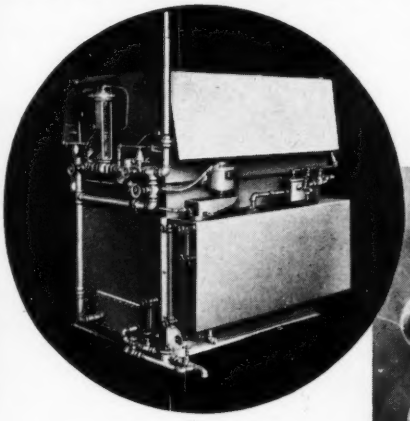
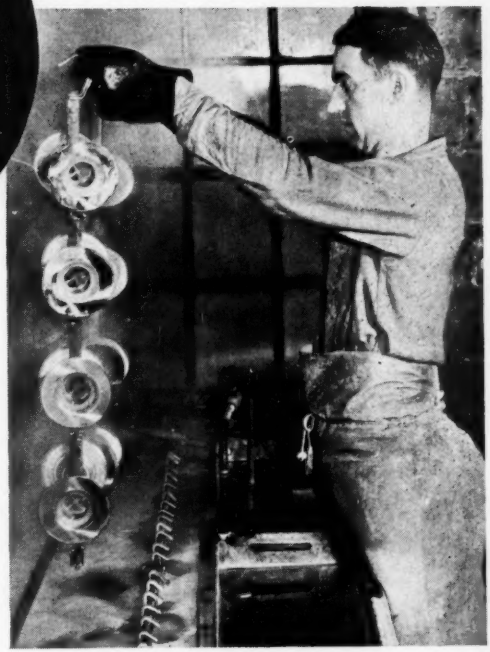
TEL: UNION 1939

Specialized Industrial Service

HOW TO CUT YOUR *PLATING COSTS*





Proper pre-cleaning practices reduce costly rejects, boost time and material into *extra* production. You can eliminate rejects and assure chemically-clean surfaces by combining solvent vapor degreasing with electrolytic cleaning.

Vapor degreasing, using PERM-A-CLOR or TRIAD solvents, means fast, efficient soil removal. Pre-soaks are eliminated. TRIAD 66, an electrolytic cleaner compounded by Detrex, completes the cycle, guaranteeing metal surfaces ready for finely plated finishes. TRIAD 66 offers the additional advantages of direct or reverse cleaning and complete rinsibility.

For full information on these products, write direct to the address below, or see us at the Industrial Finishing Exposition in Detroit, June, 1947

DETREX *Corporation*

DETROIT 32, MICHIGAN

New Baker Line of Gold Plating Solutions

We have now added a new series of solutions to our line. These are:

Concentrated Gold Plating Solution No. 319, containing one troy ounce of fine gold.

Concentrated Gold Replenishing Solution No. 320, containing one troy ounce of fine gold.

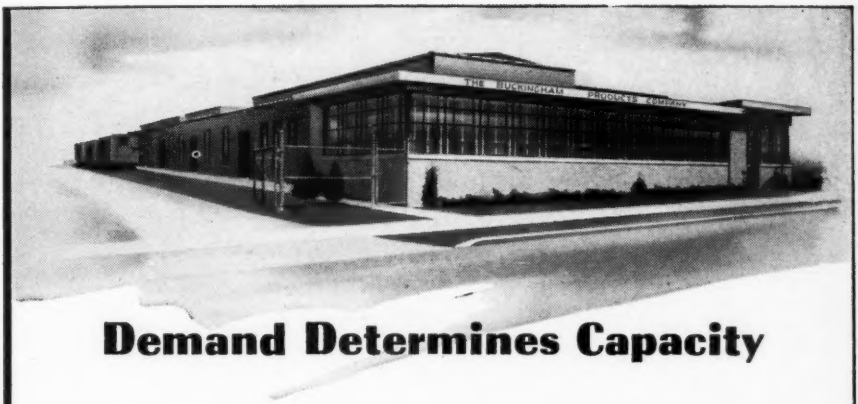
Concentrated Underplate or Strike No. 321S, containing one-half ounce of fine gold.

Gold Coloring Solutions for Light Yellow, Red and Green Gold.

Let us send you our instruction booklet for these.

If you are contemplating new installations or changes in your present equipment, we may be able to help you with money saving suggestions. We shall be glad to have you consult us.

BAKER & CO., INC.
113 Astor Street
Newark, N. J.



Demand Determines Capacity

There is no better indication of the superior quality of Buckingham polishing and buffing compositions than the new, larger Buckingham Products plant—purchased to meet a greatly increased demand.

The new plant is twice the size of the original Buckingham plant which served you so well during the past 12 years. To serve you even better—with top quality and faster service—our mixing facilities have been greatly increased also.

YOU ARE CORDIALLY INVITED TO LOOK OVER THE BUCKINGHAM PRODUCTS LINE IN BOOTH NO. 82 AT THE INDUSTRIAL FINISHING EXPOSITION IN DETROIT, JUNE, 1947.

BUCKINGHAM SALES AND CONSULTATION SERVICE IS AVAILABLE FROM COAST TO COAST

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SINCE 1896
For Plating, Metal Cleaning, Pickling, Acid Dipping, Drying and Allied Operations
FULLY AUTOMATIC SEMI AUTOMATIC
MANUALLY OPERATED
PLATING BARREL APPARATUS
STILL TANK PLATING EQUIPMENT
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Tanks and Linings *for*

Anodizing, Acid Pickling, Chromium, Copper, Iron Plating and Neutralizing Basins.

Acid proof, clean, non-warping, non-conducting.

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For Pickling, Neutralizing, Rinsing

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Production Economy!

3 METALS TREATED ON ONE BONDERIZING LINE

Steel, zinc, and aluminum—and their alloys—now can be treated on one Bonderizing* line. Here's real production economy for manufacturers with mixed metal production.

On all these metals, this efficient Bonderizing process produces tight, fine-crystal phosphate coatings which anchor the final finish, protect the metal against rust or corrosion, add greatly to the service life and lasting beauty of the products.

Bonderize steel, zinc, aluminum—and zinc and aluminum die castings, too—all on the same line. Get full information now!

SEE PARKER EXHIBIT at the SHOW
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PARKER RUST PROOF CO. 2177 E. Milwaukee Ave., Detroit 11, Mich.

*Bonderite—Reg. U. S. Pat. Off.

BONDERIZING Holds Paint to Metal | **PARKERIZING** Inhibits Rust | **PARCO LUBRIZING** Retards Wear on Friction Surfaces

PARKER PRODUCTS CONQUER RUST

INDUSTRY NEWS

Operating Management of Rheem Research Products, Inc., Becomes Allied Research Products, Inc.

The Operating Management of *Rheem Research Products, Inc., Iridite Division,* has bought the Iridite Division from the Rheem Manufacturing Company. Beginning May 1, this Division will operate as the *Allied Research Products, Inc.,* with *Mr. H. C. Irving* as President. Offices are at 4004 E. Monument Street, Baltimore 5, Md.

Allied Research has obtained from the Rheem Manufacturing Company the exclusive right to manufacture and sell Iridite in this and foreign countries on a royalty basis. They will also manufacture and merchandise a line of jewelry enameled giftware, called "Ceramicraft", and operate a job shop for electroplating of zinc and cadmium, vitreous enameling and painting.

●

Cleaning and Surface Preparation Before Painting

A special, phosphate-type conditioning treatment for removing light soils and preparing ferrous metal surfaces for painting is fully described in a 4-page *service report* issued by *Oakite Products, Inc.,* New York.

This phosphatizing treatment is supplied by *Oakite Compound No. 36,* a mildly acidic material which has the ability to remove light oils, grease, shop dirt and light rust while at the same time imparting a phosphate coating on metal surfaces to assure improved paint adhesion and resistance to corrosion. Should painted metal surfaces become scraped or "gouged" down to the bare metal after treatment with Oakite Compound No. 36, rusting will be confined to the immediate exposed area, it is claimed. Spread of rust under paint finish, and failure or "breaking away" of protective paint film is thus avoided.

Other recommended uses for this material as reported by the manufacturer are: (1) for pre-paint preparation of aluminum and galvanized sheet metal surfaces; (2) for removing heat tarnish and brazing flux residues on copper alloys; (3) for brightening steel and iron molds after alkaline cleaning.

Free Service Report providing full particulars, suggested methods of application, recommended concentration, etc., may be obtained by addressing Oakite Products, Inc., 157 Thames Street, New York 6, N. Y.

●

Finishing with Diamond Grit

The *Magnus Chemical Company's Industrial Processing Division,* at Garwood, N. J., announces the development of a new technique for the application of diamond grit to the full range of finishing operations where this polishing medium should be used. This new technique, which utilizes colored, pre-mixed diamond compounds available in tube or stick form, should ma-

WANTED

High calibre man experienced in precision plating with fluoborate solutions.

Send replies to MR-6A, The Monthly Review, P. O. Box 168, Jenkintown, Pa.

SALESMAN

For electro plating job shop plant. Metropolitan area—fairly large shop. Drawing against commission. Good opportunity for right man. State experience and commission desired.

BOX 1792, 1474 B'WAY, N. Y. C.

RELIANCE
VARIABLE SPEED
LATHES

Reliance Variable Speed Lathes Cut Costs

There is a RELIANCE LATHE for every need.

Let us quote on your requirements.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS

Plating and Polishing Machinery

Complete Plating Plants Installed

Gen. Office and Factory:

4521 Ogden Ave. Chicago, Ill.

Representatives
O. M. Shoe, Philadelphia, Pa.
Wm. R. Shields, Detroit, Mich.
C. B. Little, Newark, N. J.

Branches
LOS ANGELES and
CLEVELAND

terially expand the usefulness of diamond lapping.

The efficiency and speed of this superfinishing technique has been demonstrated in a wide range of applications. The life of carbide or steel cutting tools can be increased three to six times longer. Any shaped molds and cavities for steel, plastic, glass, etc., are quickly mirror finished and kept in better shape. Plug gauges, punches and other cylindrical surfaces are quickly and simply superfinished Production parts of any kind can be processed to any degree of finish. Rolls for all types of foil and sheet, from aluminum to silver to steel can be refinished in place in the mill. Dies of all types and shapes are easily and quickly mirror finished.

Complete information and descriptive bulletins of the *Magnus Superfinishing Compounds* may be obtained by writing to the Industrial Processing Division, Dept. *MR-1*, Magnus Chemical Company, Inc., Garwood, N. J.

●

Candee Joins Lea

The *Lea Manufacturing Company*, Waterbury, Conn., manufacturers of burring, polishing and buffing compounds and developers of finishing methods, announces the appointment of *Ellsworth T. Candee* as Director of Research and Development. Mr. Candee, formerly with the American Metal Hose Branch of the American Brass Company, assumed his duties with the Lea organization on May 15. At the annual meeting of the company in February, he had been elected a director.

Mr. Candee, a graduate of Rensselaer Polytechnic Institute, is widely known in the plating industry. He has always been active in A. E. S. circles, serving as president of the national body in 1941–1942 and currently as Chairman of the Research Committee. He will bring to his new duties as Director of Research and Development for Lea a wide knowledge of industrial requirements and a keen appreciation of the possibilities that lie ahead.

Special Heavy Duty Lead Anodes Designed for Massive Plating

The widespread appearance of massive bumpers and grillwork on the post-war automobile has thrust new problems in the laps of plating engineers.

The lead anode pictured here is part of this development. It is reputed to be one of the largest in the industry. It is not only taller than the man beside it but heavier.

This and others like it are designed for the large plating tanks now found necessary for fast plating of heavy metal work. These anodes come with special hooks for hoisting in and out of tanks.

Because of their patented sawtooth design the anodes have better throwing power as well as several times the current carrying capacity of standard anodes which have been used previously.

Heil Process Equipment Corporation of Cleveland is the manufacturer.

●

New Portable Self-Contained Dust Control Unit Announced by Kirk & Blum

The Kirk & Blum Manufacturing Company, 2887 Spring Grove Avenue, Cincinnati 25, Ohio is manufacturing a new *Self-*

HERE'S HOW TO ADD
5 to 6 Times Longer Life
TO YOUR ALUMINUM RACKS

STRIP ANODIZED FILM

WITH

DIVERSEY No. 511

Yes, an actual case history proves this! In a mid-western plant, life of costly anodizing racks has already been extended *5 to 6 times since using Diversey No. 511 stripper!*

This plant previously discarded racks at the end of 20 operating days. Such short rack life was caused by harsh strippers attacking on and around rivets, connecting joints and by weakening spring tension of the clips. But now, *after 6 months of operating time*, the original racks are still in excellent condition . . . still giving satisfactory results!

DIVERSEY NO. 511 ANODIZE STRIPPER MAKES IT POSSIBLE!

- Quickly strips anodize film from racks and rejected work. Will not attack base metal . . . action ceases as soon as film is removed.
- Leaves the surface bright and free from smut . . . saves rebuffing costs on rejected work (this saving alone more than pays for amount of No. 511 used).
- Easy to use . . . easy to control. No. 511 solutions do not require constant attention. Rapid stripping action . . . 1½ to 3 minutes.
- Patented, free-flowing powder. NO OBNOXIOUS FUMES. Comes ready to use.

come to the FAIR . . .
A. E. S. Convention and Exposition . . . Detroit . . . June 23-27 . . . and while you're there visit with Diversey . . . you'll get a warm welcome at Booth 100

For Complete Information on Diversey No. 511 Call A Diversey D-Man Or Write!

THE DIVERSEY CORPORATION
METAL INDUSTRIES DEPARTMENT
53 W. JACKSON BLVD., CHICAGO 4, ILLINOIS

Contained Dust Control Unit. This new unit is said to meet the needs of both large and small plants where layouts require the placing of one or more machines in buildings not served by the central dust control system, or in isolated parts of the main plant building.

This self-contained unit is unusually versatile; it can be set up anywhere to serve any machine for as brief or as long a period of time as needed. The unit will handle grinding, buffing and polishing dirt from metal working machines and all similar dust sources.

The Kirk & Blum Self-Contained Unit will meet many needs not feasibly covered by a central system. Exclusive features include an air volume of 900 CFM at 2-inch suction, capacity for four 3-inch, two 4-inch, or one 6-inch pipe connections; and a 4-cubic foot storage compartment, in addition to being semi-automatic in its cleaning operation.

Kirk & Blum report production is improving. Actual delivery information will be supplied in reply to each individual inquiry.

●

Tap Switch Control Models Added to Selenium Rectifier Line

The *Richardson-Allen Corporation* has announced the addition of a complete line of *Selenium Rectifiers* with tap switch controls. Their line of Selenium Rectifiers with stepless variable controls remains intact.

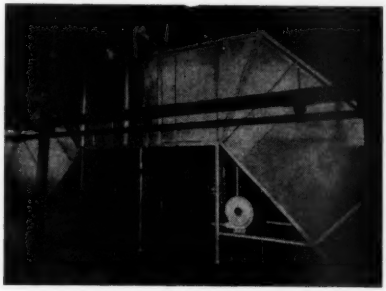
Self-contained rectifiers which include basic rectifier, motors and shunt will incorporate tap switches for 6, 9 and 12 volts for 500 and 1000 amperes capacity; 6 and 9 volts for 1500 amperes, and combination 6/12 and 9/18 volts up to 1000/500 amperes capacity.

Separate remote controls will employ tap switches from 12 volts-500 amperes to 6 volts-5000 amperes.

A special Richardson-Allen 3-gang switch presents the added advantage of one control for making voltage adjustments. Voltage taps are in approximately one-volt steps. The dc output current is not broken with R. A tap switch controls.

Burn-Off Rust-Proofing by Infra-Red Rays New Burdett Development

The *Infra-Red Burn-Off Process* has been installed in some of the largest plants in the country with remarkable success. For example, in the most outstanding installation from the standpoint of technical proof and information an *Infra-Red Burn-Off* oven replaced an alkali wash, two rinse tanks, a bonderite tank and an acid bath.



Paint technician analysis is to the effect that paint adhesion is equal or superior to adhesion on surfaces treated with the commercial liquid rust preventives.

Detailed information may be had by writing direct to the manufacturing company, the *Burdett Manufacturing Company*, 3433 West Madison Street, Chicago, Ill.

●

Heavy Duty Buffer

A new heavy duty overhanging buffer, especially adapted to long and deep work requiring maximum clearance, is now in full production by *Bradford Machine Tool Company, Cincinnati 4, Ohio.* Known as *Model "660"*, the buffer is belt driven by ballbearing motor (N. E. M. A. specifications). Motor platform is adujstable for belt tension. Design permits drive belts to be changed without removing housing from shaft. Buffer is equipped with positive shaft lock, magnetic starter, overload protection, and under voltage release. This model is produced in power range from 3 to 20 h.p. Speed—2400 r.p.m., or to specifications. Motor—220-440, 550 volt, 2 or 3 phase, 50 or 60 cycles. The manufacturer's *Electric Tool Catalog No. 3* provides additional information.

FOR HIGH OR LOW SPEEDS . . . .

Codman's Ventilated Non-Fray Buff is engineered to provide effective ventilation in high-speed operation.

Tests demonstrate that equal efficiency at low-speed operation can be obtained with the Ventilated Non-Fray.

F.L.&J.C.

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Buffing and Polishing Wheels

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Los Angeles Office
111 West 7th Street
Los Angeles, California

New Perma-Line Address

Perma-Line Rubber Products Corporation announces the change of their address, as of May 1, 1947, from 1840 North Damen Avenue to 1755 North Winnebago Avenue, Chicago, Ill.

•

A. B. Plating Supply Represents E. Reed Burns

E. Reed Burns Manufacturing Corporation announce the appointment of the *A. B. Plating Supply Company*, 1421 North Water Street, Milwaukee 2, Wis., as District Representative for the State of Wisconsin and the Northern Part of Illinois.

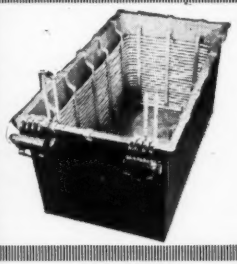
A. F. C. Johnson of the above company is well known in the territory, being a member of the Executive Committee of the Milwaukee Branch of the American Electroplaters' Society. Mr. Johnson will represent the *Burns Company* in the distribution of their products: the well-known Climax brand polishing compound and Green Thread Buffs and Polishing Wheels.

Wyandotte Chemicals Representatives Hold "Refresher" Clinics

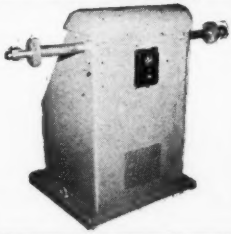
Both representatives and managers take an active part in the *Wyandotte Chemicals Refresher Clinics* being held in the seven sales regions of the *J. B. Ford Division* of the *Wyandotte Organization*. This photo

taken at the Central Region Clinic in Pittsburg shows, left to right, the Industrial Department representatives who were present: *Jack McCarthy*, Columbus; *Earl Soop*, Technical Service Department, Wyandotte; *Charlie Chalfant*, Dayton; *John Rowan*, Pittsburgh; *Tom McHugh*, Cincinnati; *Evans Schmeling*, Assistant Manager, Industrial Department.

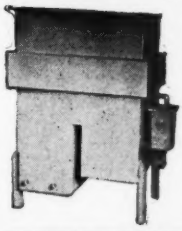
RANDALL'S
ENGINEERED EQUIPMENT



TANKS



LATHES



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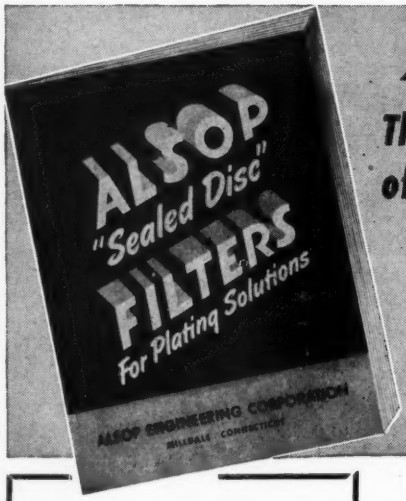

Mr. Plater—

This New Book on Filtration of Electroplating Solutions

Based on 25 Years Filtration Experience

Was written especially for YOU

A SUMMARY OF CONTENTS

Explains the Fundamentals of Filtration for plating applications.

Describes the versatile, compact Filters—and outlines the superior features of the many sizes and capacities available.

Shows why the filter discs are easy and simple to change when necessary.

Suggests distinctive advantages for use in various plating installations and on practically all types of plating solutions.

Describes the unique sealed feature which provides positive protection against loss of solutions through leakage and dripping.

Shows detailed diagrammatic views of internal and working parts and how they are used.

This fact-filled book just off the press was compiled to tell you exactly how, why and where "*Sealed-Disc*" Filters can help you get finer finished plated work from your plating solutions It contains 50 carefully chosen photos, diagrammatic views and 4500 words describing the "*Sealed-Disc*" Filters and "*Centri-poise*" Pumps.

The "*Sealed-Disc*" Filter for plating solutions was designed in 1939 based on over 17 years previous filtration experience. Now after an additional 8 years of constant improving we feel that our latest models will meet even greater success in fulfilling the demands of the plater for a dependable filtration system. Send for your NEW BOOK today . . . mail the coupon below.

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Please send me, FREE, your NEW Book "*Alsop Sealed-Disc Filters For Plating Solutions*".

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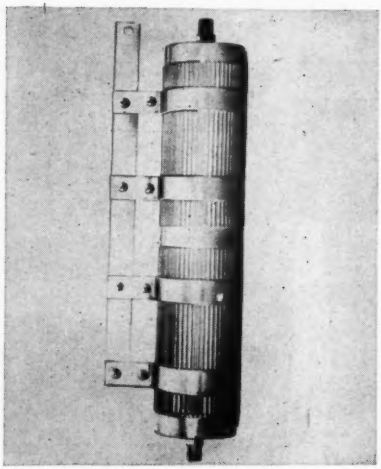
New High Amperage Rectifier



Selenium Rectifiers produced through a new method of electrolytically depositing selenium have been developed by *Ion Industries, Inc.*, Riverdale (Chicago 27), Ill. These rectifiers are cylindrical in shape with circulating liquid cooling for more efficient heat dissipation to produce unusually high amperage capacity—many times greater than was previously considered possible. Aside from the recognized advantages of liquid cooling, a complete hermetical seal of the active surface area is possible thus assuring long-life, trouble-free operation.

ION Selenium Rectifiers are constructed in standard unit elements. Assemblies can be made in the number needed for the output in amperes and voltages required—connecting in series or in parallel—in capacities from 250 amperes of the standard single element to assemblies for large-scale industrial applications.

The ION Selenium Rectifier shown in the accompanying illustration is the Standard S-300 Unit with a rating of 250 amps. continuous, 500 amps. intermittent. Size is 16 inches high, 3 inches wide, and 6¼ inches in depth. Weight is 4 pounds.

●

Divine Offers New Bulletins on Polishing

Divine Brothers Company, manufacturers of metal finishing machinery and supplies, announces the publication of two new bulletins.

The first of these bulletins contains brief definitions of buffing and polishing operations, and shows a convenient table for estimating surface feet per minute from r.p.m. for wheels from 4 inches to 24 inches in diameter. Recommended wheel speed for the various operations are shown.

The second bulletin describes the balancing tubes available in *Divine Clothflex Polishing Wheels*—previously standard in the *Divine Compress Wheel* and *Divine Leather Covered Wheel*—and eight different wheel hubs available on *Divine Polishing Wheels*.

Available by writing Divine Brothers Company, 200 Seward Avenue, Utica 1, New York.

●

Optimus Detergents Announces New Cleaner

Optimus No. 100, a new cleaner, has just been announced by *Optimus Detergents Company*, 120 Water Street, Matawan, N. J., manufacturers of industrial cleaning materials.

A white, free-flowing powder, Optimus No. 100 is completely soluble in hot or cold water. It is a balanced blend of mild alkaline materials, including special water softening ingredients. It is free rinsing and at low concentrations is soft on the skin.

An important application of this new product is in power spray washing machines. Here it is used at concentrations of one-half to two ounces per gallon at temperatures from 130° F to boiling. It is very effective in removing light oils, grease and dirt, and may be used on ferrous or non-ferrous metals.

Optimus No. 100 may also be used for light duty plant maintenance cleaning where sudsing would be objectionable.

Electro-cleaning with Optimus No. 100 is carried on with good results where a cleaner of highly stable electrical conductivity is desirable. It has a long life for such purpose.

A variation, Optimus No. 100A, contains the same ingredients but also embodies an efficient synthetic wetting agent for soak cleaning of steel surfaces.

Available in 100- and 400-pound containers.

WE LOOK FORWARD
TO YOUR VISIT AT OUR

☆ ☆ ☆ ☆ ☆ **BOOTHS 249-250**

JUNE 23-27

INDUSTRIAL FINISHING
EXPOSITION
DETROIT

OUR COMPLETE LINE
OF RUBBER COVERED
TANKS, RACKS, GRIPS
AND OTHER EQUIP-
MENT FOR PLATERS
WILL BE DISPLAYED!

☆ ☆ ☆ **AUTOMOTIVE RUBBER CO., INC.**

8601 EPWORTH BLVD. DETROIT 4, MICH.

Robert H. Ehret Appointed Assistant Sales Manager of The Electric Products Company

Mr. Gordon J. Berry, Vice-President and Sales Manager of *The Electric Products Company*, 1725 Clarkstone Road, Cleveland 12, Ohio, announces the appointment of *Robert H. Ehret* to the position of Assistant Sales Manager.

Mr. Ehret will be responsible for handling headquarters sales negotiations. He joined The Electric Products Company on November 1, 1945 after 14 years of selling, applying and installing apparatus for prominent electrical manufacturers.

●

New Coating for Irregular Surfaces and Tanks

A new vinyl type coating has recently been perfected by *Heil Process Equipment Corporation* for tanks and rack fixtures used in the plating and chemical industries.

The new coating designated as *Heilex 445* (available as a lining also) has well defined resistance to chemicals and is noted for its rough surface and high bonding characteristics. Acids such as sulphuric, hydrofluoric, hydrochloric as well as nitric and chromic oxidizing acids have no deteriorating effect.

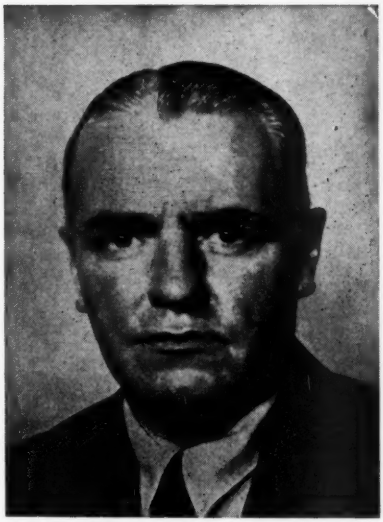
Physically, this plastic is rubbery and tough. It resists abrasion and rough handling. If damaged by sharp objects it can be readily repaired on job site with a patching material supplied by Heil.

Another unique property of Heilex 445 is the negligible effect of temperatures up to boiling. This broadens its usefulness to keep pace with the constant demand for faster, and in many cases, hotter processes.

The coating has been approved by manufacturers of nickel salts for bright nickel plating. It is giving good service on racks, stanchions, fixtures, tanks in copper, nickel and chrome sequence. It protects the plating solution from contamination and the rack from corrosion.

○

Optimus Detergents Appoints Edward G. Mansfield



Edward G. Mansfield, of Perth Amboy, N. J., has been appointed field service representative by *Optimus Detergents Company*, Water Street, Matawan, N. J., manufacturers of industrial cleaning materials. Mr. Mansfield will cover New York City and Essex, Union and Middlesex Counties in New Jersey.

●

Dust Control—Air Filtration

A new 23-page illustrated booklet discusses various types of industrial dust problems and typical applications of *AAF Air Filters* to such problems. Includes a

Outstanding!
McGEAN
BRIGHT NICKEL
PLATING PROCESS
Preferred for its:
• ECONOMY
• CONSISTENT PERFORMANCE
• EASE OF CONTROL
See our display of Automotive and other Parts, Plated With McGean Bright Nickel, at the Industrial Finishing Exposition, Detroit, June 23-27.
THE McGEAN CHEMICAL COMPANY
CLEVELAND 15, OHIO

chart of size and characteristics of airborne solids and sections dealing with atmospheric dust, and filtered air for industrial air conditioning, ventilation, drying, product finishing, control of bacteria and mold spores, cooling electrical equipment, engines, compressors and other industrial applications. Issued on request by *American Air Filter Company*, 215 Central Avenue, Louisville 8, Ky.

●

Harris Now with U. S. Rubber

Richard P. Harris of Norwalk, Conn., has been appointed Factory Manager of the Electroforming Department of *United States Rubber Company* at Detroit. He was formerly Assistant to the Factory Manager, Chance Vought Division of United Aircraft Corporation, Stratford, Conn.

Mr. Harris was graduated in mechanical engineering from Pratt Institute in 1933 and has held several positions of responsibility in metals fabrication and in industrial engineering.

Coloring Process—For All Steels

A new oxide *Coloring Process* for treating all types of steels, known as "*Blu-Blak*", was developed originally for the firearms industry as a gun bluing. Some of its un. usual features are: all steels are colored to a deep rich, blue-black including case hardened and cyanide hardened parts. Patrs are immersed in the bath for 15 to 60 minutes "Blu-Blak" penetrates to a maxiumm depth of .001 inch to .004 inch determined by the metal's hardness, and colors from the inside out.

The bath gives extended service as a result of non-sludging and the lower operating temperatures (functions on all steels within a 250 to 295° range). Foreign matter rises to the surface and may be easily-skimmed off. It requires no expert servicing, does not require expensive automatic temperature controls, and imparts to the treated metal an excellent abrasion resistance and immunity to corrosion in salt spray tests. Manufacturer: *Protective Coatings, Inc.*, Box 3985, Detroit 27, Mich.

FELT WHEELS

"FELT DOES IT BETTER"

. . . Felt Wheels have a combination of density, resiliency and adaptability that means higher finishes and longer wheel life. When you order Felt Wheels specify PARAMOUNT BRAND for top quality and uniformity. Write us about your requirements.

BACON FELT COMPANY WINCHESTER, MASSACHUSETTS

Felt Manufacturers for Over One Hundred Years

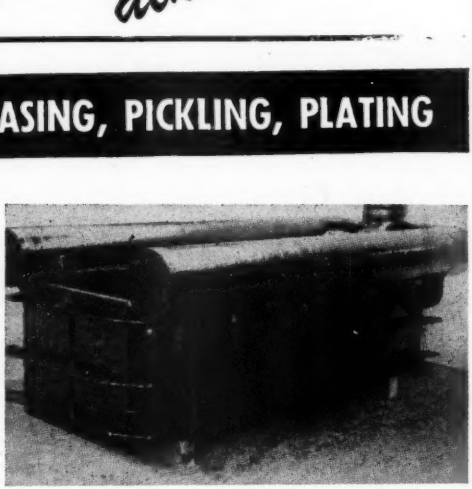
ORDER PARAMOUNT BRAND FROM YOUR DEALER

Tanks... Piping... Fume Duct... *made of the* NEW **HAVEG "60"**

defy corrosion by

acids . . solvents . . alkalies . .

for CLEANING, DEGREASING, PICKLING, PLATING



Haveg "60" is completely resistant to most of the new compounds being offered for the latest metal cleaning processes . . . Haveg "60" has been especially approved for use with the bright nickel solutions. Haveg "60" is the newest grade in a family now numbering four, which provides a complete range of standard size molded plastic chemical equipment for use with acids, solvents and alkalies. Seamless, one-piece tanks as large as 10 feet in diameter by 12 feet high are readily and economically molded by Haveg.

WRITE TODAY for Haveg Bulletin F-4. It gives complete data on the chemical resistance of all four grades of Haveg . . . details constructional features . . . tabulates all standard size tanks, piping, fume duct, towers, pumps, valves and special equipment. A special insert gives complete data on the NEW HAVEG "60".

HAVEG CORPORATION

NEWARK, DELAWARE

FACTORY–MARSHALLTON, DELAWARE

CLEVELAND 14	CHICAGO 11	DETROIT 11	LOS ANGELES 13
550 Leader Building	1201 Palmolive Building	2832 E. Grand Blvd.	601 W. Fifth St.

du Pont Engineer Wins Young Author Award

Norman Arnold Nielsen, Metallurgical Engineer in the Engineering Research Laboratory of the *du Pont Company's Experimental Station*, Wilmington, was presented the 1946 Young Author's Prize of the Electrochemical Society on April 10.

The award, given annually to authors under 27 years of age for the best technical paper in the year's publications of the society, was presented at the spring meeting of the society.

Nielsen was co-author with *Dr. E. M. Mahla*, group supervisor of the materials of construction section at the du Pont Experimental Station, of *Passivation of Stainless Steel*, the prize-winning paper.

●

Paint Stripper

A non-inflammable, fast acting liquid *Paint Stripper*, marketed as "*Paint-Zip*", easily and quickly removes paint, varnish, enamel, and lacquers from wood without raising the grain. It generally requires only one application despite the number of layers of paint. It contains no abrasives, and gives off no dangerous fumes, is simple to use and may be applied in various ways. It starts to act immediately.

While especially recommended for wood because it does not raise the grain, it is equally effective on all types of metals since it causes no oxidation or discoloration. Manufactured by *Turco Products, Inc.*, Dept. M.R., 6135 South Central Avenue, Los Angeles 1, Calif.

●

Wyandotte Has New Solvent Emulsion Type Detergent

A new solvent emulsion type detergent, *Wyandotte Emlon*, for use in the metal finishing industry has been announced by *Dr. Roy Heath*, Manager Industrial Department, *Wyandotte Chemicals Corporation*. This product is a unique combination of organic solvents and emulsifiers and lends itself to the formation of unusually stable emulsions even in the presence of acids, alkalies and other electrolytes.

The experiences of Wyandotte Service Engineers have shown this product to be

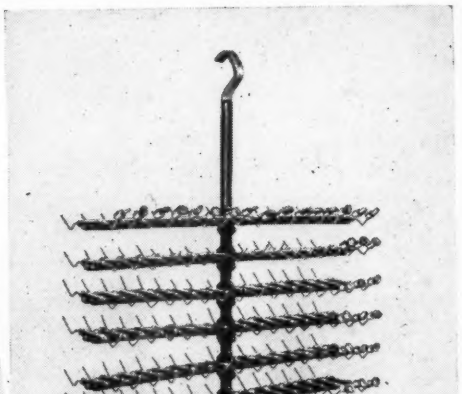
FOR SALE

THE FOLLOWING EXCELLENT REBUILT AND GUARANTEED ELECTROPLATING MOTOR GENERATOR SETS, WITH FULL CONTROL EQUIPMENT:

2—15,000/7500 AMPERE, 6/12 VOLT, **COLUMBIA ELECTRIC COMPANY** Latest Design Unit, with Separate M. G. Exciters.
2—5000/2500 AMPERE, 6/12 VOLT, **A. P. MUNNING COMPANY** "OPTIMUS" Design, Separately Excited.
1—5000/2500 AMPERE, 6/12 VOLT, **CHARLES J. BOGUE ELECTRIC COMPANY,** Interpole Design, Separately Excited.
1—4000/2000 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY,** Compound Wound, Separately Excited.
1—2500/1250 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY,** Shunt Wound, Separately Excited.
1—2000/1000 AMPERE, 10/20 VOLT, **COLUMBIA ELECTRIC COMPANY,** 25 Unit, with Synchronous Motor Drive.
1—2000/1000 AMPERE, 6/12 VOLT, **HANSON-MUNNING**—40° Unit, Interpole Design. Separately Excited.
1—1500/750 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS COMPANY,** Separately Excited, Ball-bearing design.
1—1500/750 AMPERE, 6/12 VOLT, **COLUMBIA ELECTRIC COMPANY,** Latest Design, Separately Excited.
1—1500/750 AMPERE, 12/24 VOLT, **CHANDEYSSON ELECTRIC CO.** Unit. Synchronous Motor Drive. Direct Connected Exciter.
3—1000/500 AMPERE, 6/12 VOLT, **CHARLES J. BOGUE ELECTRIC COMPANY**—Practically New, Separately Excited.
1—1000 AMPERE, 25 VOLT, **HANSON-VAN WINKLE-MUNNING COMPANY**—Separately Excited—Anodizing Unit.
1—1000 AMPERE, 15 VOLT, **HANSON-VAN WINKLE-MUNNING COMPANY**—Separately Excited—Anodizing Unit.
10—100 AMPERE, 7½ VOLT, **HOBART ELECTRIC CO.**
5—**ABBOTT BALL COMPANY** BURNISHING BARRELS—VARIOUS SIZES.
SMALLER UNITS FROM 50 AMPERES UP, CARRIED IN STOCK AT ALL TIMES FOR IMMEDIATE SHIPMENT.
1—**MEAKER** SEMI-AUTOMATIC CONVEYOR UNIT. For Cyanide Plating. Excellent Condition. 20 ft. x 3½ ft. x 4 ft. deep.
ANODIZING MOTOR GENERATOR SETS—in stock for Sulphuric or Chromic Acid Solutions. Large Selection. Write for details.

M. E. BAKER COMPANY 143 SIDNEY STREET CAMBRIDGE, MASS.

ONE PART -- OR 320 PARTS



STANDARD RACKS

improve your plating operation

The plating of large parts racked one-at-a-time, or of small parts loaded in quantity, is a faster, more efficient operation if you use Standard racks. They're designed to fit your equipment and your piece part perfectly.

Standard racks have an almost indefinite life, too, thanks to their heavy coating of STAND-IT-ALL, the insulation that is impervious to all plating solutions, remains resilient and will not crack or chip off. STAND-IT-ALL prevents plating of the rack, saves plating material by allowing deposit only on the piece part.

For large or small parts in any quantity, use Standard racks for a better plating operation.

STANDARD

STANDARD PLATING RACK COMPANY

1913-1925 North Paulina Street, Chicago 22, Illinois

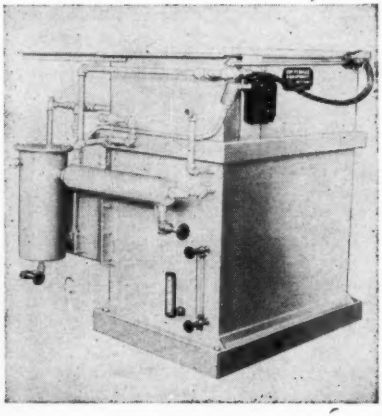
exceptionally effective and economical in a wide variety of applications—in power spray washers, pre-soak and still tanks, for cleaning prior to phosphatization, and as an adjunct to acid or alkali cleaners. In addition to many other uses where an emulsifiable solvent is desired, Wyandotte Emlon is added to stamping and drawing compounds to facilitate their removal.

Wyandotte Emlon can be safely used on ferrous as well as non-ferrous surfaces. Its high boiling and non-foaming characteristics provide longer cleaner life in addition to making it easy to use. Package sizes are 5-gallon, 15-gallon and 55-gallon drums.

●

New Metal Parts Vapor Degreaser Announced by Optimus Equipment Co.

A new standard model *Vapor-Spray Type Metal Parts Degreaser* has just been introduced by *Optimus Equipment Company*, 127 Water Street, Matawan, N. J., engineers and manufacturers of metal degreasing, cleaning and drying equipment.



Known as *Type OP-1-48*, this new Degreaser is designed for use with trichlorethylene, with every consideration given for solvent conservation. Unit is fabricated of 3/16-inch steel plate and reinforced by structural numbers and all electrically welded. Body of unit and internal auxiliaries are hot dip galvanized after fabrication. Heating and cooling coils, which are designed for maximum efficiency in the complete recovery of solvent, are readily

Greetings:

Members and Friends of A. E. S.

●

When you CHECK your polishing compounds and buff needs with REED–BURNS, you CHECK with a source known since 1888 for Uniformity of Quality, Prompt Personalized Service and Delivery.

●

Fair market prices.

●

WRITE or WIRE for Recommendations and Samples!

E. REED BURNS MFG. CORP.

40 Withers St., Brooklyn 11, N. Y.

FACTORIES
Brooklyn, N. Y. Middlesex, N. J.

●

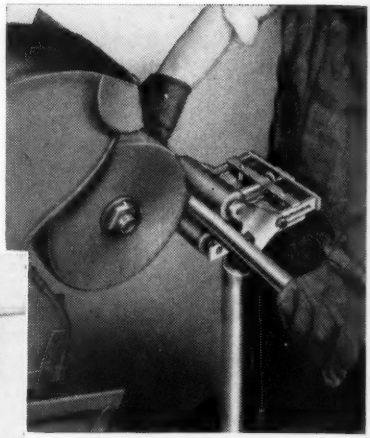
Makers of the well-known products:

- **No. 7 WS Red Rouge**
- **No. 14 & No. 190 Steelshine**
- **EMERITE-TRIPOLEX**
- **GREEN THREAD**
- **BUFFS and WHEELS**

"A Complete Line"

Polishes Tubing Many Times FASTER

Produces Uniform Finish No Spiraling Effect



Polishing tubes evenly at high speed is easy with the PRESTO Semi-Automatic Tube *Polishing* Machine. As the tube rotates it feeds automatically across the polishing wheel or belt producing a uniform finish free from the spiraling effect which is prevalent when tubes are polished by hand.

ALL OVER the country, from coast to coast, PRESTO Semi-Automatic Tube *Polishing* Machines are speeding production, avoiding spoilage and producing uniform finish not attainable in production by hand polishing.

Completely portable and adjustable, the PRESTO Semi-Automatic can be set up to any standard polishing lathe in a jiffy. You merely push the machine up to the wheel, adjust for height and to fit the tube, insert the tube and start the lathe. Total setting up time is less than five minutes.

You can polish tubes from ¾″ to 5″ diameter and in any length, using PRESTO Tube Support Stands for long tubes as illustrated.

Rollers of the Tube Support Stand are adjustable to fit the tube and to coordinate with movement of tubing across the polishing wheel or belt.

Ask your Jobber or write for Bulletin 103.

Presto
POLISHING ROOM
Accessories
BULLETIN 103
Work Holding Spinners ..... Page 2
Spinner Ceiling Support ..... Page 2
Polishing Wheel Balance Weight ..... Page 3
Tube Polishing Machines ..... Page 3
Tube Support Stand ..... Page 4
Work Supporting Roller ..... Page 4
Scratch Brush Lathe ..... Page 5
Polishing Wheel Bushings ..... Page 5
Nuts and Flanges ..... Page 6
Balance Weights ..... Page 6
Screw Points and End Chucks ..... Page 6
Buff Chucks and End Plate Chucks ..... Page 7
Lathe Collars and Wrenches ..... Page 7
Modern Wheel Rakes ..... Page 7
Cast Iron Emery Troughs ..... Page 8
..... Page 8
The MANDERSCHEID Co.
Serving the Metal Finishing Trade over 35 Years

Send for your copy of the new PRESTO Catalog.

The **MANDERSCHEID** Co.

810 Fulton Street, Chicago 7, Illinois

Serving the Metal Finishing Trade over 35 Years.

removable for cleaning and maintenance. The unit acts as a still to recover the contaminated solvent, thereby providing a continuous supply of pure distilled solvent for the spray as well as for the vapor phase.

Heat to vaporize the solvent may be supplied by either steam, gas or electricity. Automatic vapor and temperature controls are optional accessories.

Work clearance of this Degreaser is 45-inch length by 27-inch width. It has a capacity of handling 200 pounds of steel per hour.

•

Hart Sales Engineering Manager of Cee-Bee

Joseph F. Hart, active A. E. S. member for many years, has been made Manager of the Department of Sales Engineering of *Cee-Bee Chemical Company, Inc.,* Los Angeles manufacturer of specialized industrial chemicals.

This is a new department organized to secure a more practical application of scientific principles to specialized cleaning and processing problems in the field.

Hart's place as Cee-Bee technical director is being taken by *Keith Whitcomb,* formerly Research Chemist for Ryan Aeronautical Company, San Diego, and Chief Chemist, Marine Air Corps Station, El Toro, Calif.

•

New Rack Coating

Peninsular Chemical Products Company announces an illustrated bulletin on *Pen-Kote 590*—a non-inflammable, odorless Saran-base rack coating which withstands chlorinated degreasing solvents as well as all plating and cleaning solutions.

Unretouched photos show how this coating is quickly applied by hand dipping, without bridging or webbing; and other advantages are illustrated and described in detail. A free trial offer is included.

Copies of the bulletin are available upon request from Peninsular Chemical Products Company, 6795 East Nine Mile Road, Van Dyke, Mich.

UNITED PLATERS INC.

A Complete Service Under One Roof

PLATING SERVICES

•

Tin
Zinc
Lead
Brass
Bronze
Copper
Iriditing
Cadmium
Chromium
Black Zinc
Black Nickel
White Nickel
Bright Nickel
Hard Chromium

Laboratory Controlled

Plating—Rustproofing
Anodizing—Electro-Polishing
Hot Coatings—Sandblasting
Roto-Finishing

•

"Let Our Engineers Work for You"
Full Automatic Tanks and Barrels
"Government and Automotive Specifications Guaranteed"

Special Process for Plating Spring Steel

Storage and Direct Shipping Facilities for Out of Town Customers

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994 MADISON AVE
DETROIT 7, MICHIGAN
RAndolph 4050

OTHER SERVICES

•

Tinning
Pickling
Tumbling
Oxidizing
Cronaking
Burnishing
Alumiliting
Passivating
Parkerizing
Galvanizing
Lead Coating
Dichromating
Bright Dipping
Chromate Priming

NO S.O.*

in GRIPMASTER PATENTED POLISHING WHEEL CEMENT

AT LAST! YOU CAN BE RID OF OBJECTIONABLE ODORS OF OLD-FASHIONED ADHESIVES

While You Boost Polishers' Output!

NOW! IT'S *EASY* to say "goodbye forever" to the annoying, morale-shattering, production-reducing *Stockyards Odor* of old-fashioned adhesives. It's *easy* to give your polishers better working conditions—and at the same time *step up their production*—when you use GRIPMASTER . . . the new, modern, *odor-free* polishing wheel cement. **There's NO S.O. IN GRIPMASTER!**

You'll win new profits, too. Here's why: GRIPMASTER contains a secret new high-heat resisting ingredient. It *does not "glaze"* on the wheel. Experience of leading plants *proves* GRIPMASTER *boosts* polishers' production an average of *47% more* pieces per head!

One grade grips ALL grains—250 to 20

***S**tockyards **O**dor.

FREE GENEROUS SAMPLE

GRIPMASTER DIVISION
NELSON CHEMICALS CORPORATION
(formerly Michigan Bleach & Chemical Co.)
12345 Schaefer Highway, Detroit 27, Mich.

IN CANADA:
Nelson Chemical Co., Ltd.
Windsor, Ontario

Please send us a generous free sample of Gripmaster.

COMPANY_____

ATTENTION_____

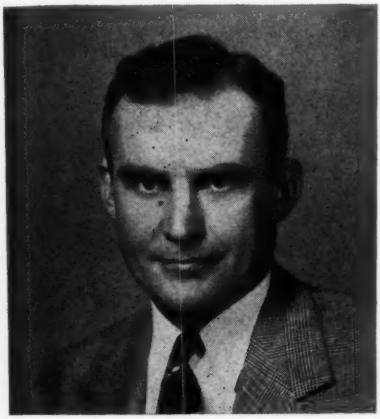
ADDRESS_____

CITY_____ STATE_____

M. R. 5

We'll See You at the Industrial Finishing Exposition, Detroit, June, 1947

Robert R. Kovach Appointed Chicago District Manager of The Electric Products Company



Mr. Gordon J. Berry, Vice-President and Sales Manager of *The Electric Products Company*, announces the opening of a new District Office in Chicago at 915 Old Colony Building, 407 South Dearborn Street.

Mr. Robert R. Kovach is the Chicago District Manager and is responsible for handling all sales and service negotiations in the territory.

Mr. Kovach graduated from the University of Kansas in 1939 with a B.S. degree in Mechanical Engineering. After six years of sales and engineering experience as well as a year of management consulting, he joined The Electric Products Company in July, 1946.

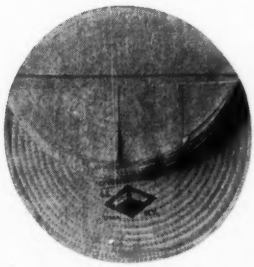
•

Wet Belt Grinding

Four-page *Bulletin No. 656*, issued by *Porter-Cable Machine Company*, 1715 North Salina Street, Syracuse 8, N. Y., describes and illustrates *Type L-4 wet-or-dry belt centerless grinder*. A full discussion of the machine's construction and operational features precedes a page of specifications.

DIVINE SEWED PIECED BUFFS

VERSATILE — ECONOMICAL — AVAILABLE



Spirally sewed, 3/8", 1/4", in a variety of grades—Bleached, Unbleached, Colored . . . uniform in quality . . . excellent in finish . . . built in balance . . . full diameter . . . economical to use. Since 1892 the standard of quality in pieced buffs. Available for prompt shipment.

Polishing and buffing equipment is our specialty. Write us about your problems . . . we have a product to meet your every need!

Divine Brothers Company

UTICA 1, N. Y., U. S. A.

Brown Establishes Baltimore Branch

Brown Instrument Company, Philadelphia industrial precision instrument manufacturer, has extended its nationwide program of sales and service expansion to the Baltimore area.

W. J. Law, formerly with H. P. Rogers, agent, will be in charge of sales, assisted by *J. F. Maienshein*. Brown and its parent company, *Minneapolis-Honeywell Regulator Company*, moved to its new site on 1209 East 25th Street, about May 1.

●

Two Booklets Provide Helpful Data on Coolants and Rust Preventives

In a recent announcement sent to metal working plants across the country, *Oakite Products, Inc.*, New York, offered free copies of an informative, illustrated booklet providing many specific production suggestions for preventing formation of rust on ferrous surfaces between machining operations. It provides valuable data on temporary or semi-permanent rust protection of ferrous parts or work with *Oakite Special Protective Oil*, following such operations as grinding, machining, pickling, tumbling, sand blasting, brazing, etc.

Industry personnel and readers of this publication desiring free copies may obtain them by addressing Oakite Products, Inc., 157 Thames Street, New York 6, N. Y.

●

Campion Laboratories Has New Home

Campion Laboratories, a division of Campion-Detroit, Inc., has a new home, at 9212 Central Avenue, Detroit 4, *President Don C. Campion, Sr.*, announced recently.

With a 17-year reputation in industrial instrumentation work, the Campion Laboratories have done considerable work in automatic inspection equipment toward eliminating chances for human error and reducing labor costs.

●

Yerger Leaves Lea

The *Lea Manufacturing Company*, Waterbury, Conn., announces the resignation of *Charles W. Yerger* as Chairman of the Board with complete severance of all connections with the company.

McKeon's
"Liquid Sulphur"
TRADE MARK REG'D.

"The Copper Strip of Today"

Strips Evenly
Load to Capacity
No Possibility of Etch
No Hydrogen Embrittlement

BOOTH 110
AES CONVENTION
DETROIT . . . JUNE 23 to 27

Sulphur Products Co. Inc.
Greensburg 9, Pa.

Valves for Solids-Bearing Liquids

McAlear Manufacturing Division of Climax Industries, 1901 South Western Avenue, Chicago 8, Ill., offers *Macalator Flexifram Valves* for control of supply lines subject to inclusion of solids which may prevent positive closing of ordinary valves.

Among outstanding applications claimed by the company are in lines for compressed air, chemicals and oils, and waters.

•

New Roto-Finish Machine

A new *Roto-Finish Midget-size Machine* is announced by *The Sturgis Products Company* as being added to the Roto-Finish line of Finishing and De-burring Machinery. The new Roto-Finish Midget is designed to permit greater time and labor economies in mechanical finishing and de-burring very small parts. It provides greater efficiency in processing large quantities of small parts as well as small lots of parts. Cylinders of the new Roto-Finish Midget are 8 inches wide, 12 inches across the flats. It has a variable drive of 35 to 70 rpm. Flats are lined with kiln dried hard maple, and ends are rubber sealed. Cover is secured to cylinder and cylinder mounted on machine by ingenious lock and adjustable clamp that permits quick loading and unloading. Machine can be supplied without base for bench mounting. Hand Parts Separator is supplied and is equipped with drain connection. Interchangeable screens are available in all mesh sizes for separation of chips from parts. Installations where the new Roto-Finish Midgets are most suitable are small plating shops; manufacturing plants with small finishing departments; and those plants engaged in furnishing only very small parts. All mechanical finishing operations may be performed in the Roto-Finish Midget—Grinding, De-burring, Polishing, Brite-honing and Coloring. The controlled rotary action of the wet mixture of Midget chips and compound produces a surface suitable for plating by removing uniformly burrs, sharp edges and corners on small stampings, machined parts, die castings.

For complete information on the new Roto-Finish Midget Machine, write to The Sturgis Products Company, Sturgis, Mich.

See YOU at the Exposition!

BOOTH 336

with our complete line of

Speedie

Polishing and Buffing Compositions

Stainless Steel . . . Chrome . . . Nickel . . . Tripoli . . . Emery Paste . . . Grease Stick . . . Satin Finish (Greaseless)

Buffs . . . Polishing Cements . . . Turkish and American Emery . . . Artificial Abrasive Grains

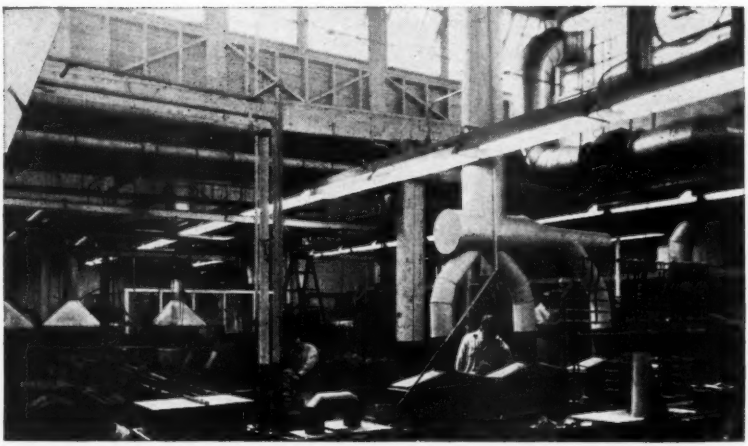
THE BUCKEYE PRODUCTS CO.

7020 VINE ST. CINCINNATI 16, OHIO

Cable Address: Buckprod

AMERICAN BOSCH PLANT GETS WITH G-E RECTIFIER "PACKAGE"

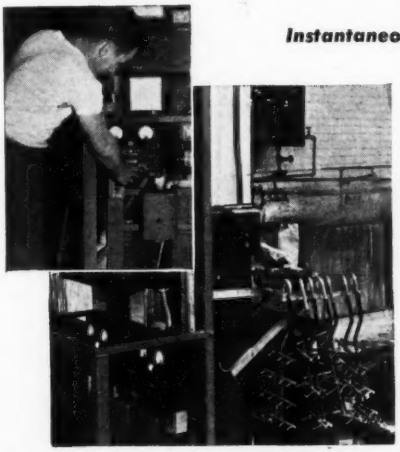
General Electric units keep watch over tank conditions 24 hours a day — put flexible, push button control in plating room, next to tanks



In a move for increased efficiency in plating power equipment, American Bosch Corporation of Springfield, Mass., manufacturer of precision automotive and aircraft equipment, has recently completed installation of an entire new bank of General Electric rectifiers with automatic voltage control. Running on a 24-hour-a-day schedule, this combination of General Electric rectifiers, automatic "on load" controls, and operator's control boxes maintains automatic control over 5,000 amperes of plating current.

With rectifiers and automatic voltage-control units located entirely clear of the plating room, the installation provides easy checks and maintenance of equipment without interruption of plating operations. Operator's control boxes, however, are located where they are needed, right at the tanks, for convenient readings and instantaneous push button control for necessary changes in voltage. In general, the installation gives flexibility, when and where it is needed, and constant voltage for long, consistent runs.

AUTOMATIC VOLTAGE CONTROL



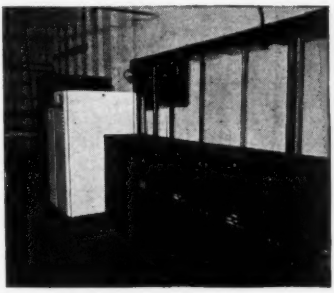
Push button control located next to tanks gives operator at American Bosch Corporation on-the-spot control of plating voltage.

Instantaneous Push Button Control of Voltage

"Start," "stop," "raise," and "lower" buttons on operator's control box give immediate response when changing voltage conditions are required. Operator merely holds button down until necessary voltage is reached. On reaching required voltage, General Electric automatic "on load" induction-type control maintains constant voltage throughout operation. Stepless voltage changes, and no rheostat losses on partial load.

Automatic Operation With "Packaged" "2000" Rectifiers and Controls

Typical automatic "package" consists of the General Electric 12-kw "2000" rectifier in combination with induction-type "on load" rectifier control and operator's control box. The combination automatically maintains output voltage from *no load* to *full load* within ± 2 per cent, gives complete flexibility regardless of load requirements.



Maintenance of units is negligible; efficiency of operation is high. Result: an economical power system with low maintenance cost and with all the convenience needed for the most exacting plating operations.

For assistance in converting your plating shop to General Electric "packaged" power units — or for descriptive data — write to Section A82-658, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

Visit our booth at the Industrial Finishing Exposition in Detroit, June 23-27.

GENERAL ELECTRIC

COME

TO THE

ROTO-FINISH

BOOTH NO. 87

★

SEE

HOW YOU CAN FINISH PARTS MECHANICALLY

• CUT LABOR COSTS

• SAVE TIME!

ROTO FINISH

THE STURGIS PRODUCTS CO.

704 Jacob Street

Sturgis, Michigan

Blouch Joins Heil

Howard H. Blouch is now employed in the sales promotion of chemical proof tanks and heating devices for the *Heil Process Equipment Corporation*, Cleveland 11, Ohio.

This new association follows process engineering for the Van der Horst Corporation, the White Sewing Machine Company, and twenty years of sales engineering for the Electroplating Division of the E. I. du Pont de Nemours and Company, Inc. While employed by the latter, Mr. Blouch traveled extensively in the development of the electrolytic tin plate, copper, brass, and silver plating.

•

New Air-Dry Rack Coating

Air-Dry Rack Coating 266, just announced by *U. S. Stoneware Company*, Akron, Ohio, cuts the time required to apply air-dry rack coatings almost 75 per cent. Most air-dry rack coatings require seven to nine dips to build a coating sufficiently thick to provide any real degree of protection. With Rack Coating 266 two dips are usually ample.

Coating 266 is resistant to all plating solutions, including hot alkaline cleaners. It requires only 20 to 30 minutes drying time per coat. Coating 266 possesses excellent adhesion to all surfaces, is flexible and resilient to withstand mechanical shock in handling.

Ask for *Bulletin R-24*.

Brown Instrument Promotes Three to New Positions

Henry M. Schmitt has been named Chemical Industry Manager of the *Brown Instrument Company*, Philadelphia. *O. B. Pyle* has been made Industrial Manager of the Philadelphia branch and *A. W. Roat* is now Industrial Manager of the St. Louis branch of the industrial division of *Minneapolis-Honeywell Regulator Company*.

The sales executive staff changes were made known by *W. H. Steinkamp*, Field Sales Manager for Brown. At the same time Mr. Steinkamp announced that *Harry D. Ruch* will work out of the industrial sales division at Philadelphia.

•

Frahme Joins U. S. Stoneware

Herman H. Frahme, who resigned as Plant Superintendent and Plant Manager of *Chemical Equipment Division, General Ceramics and Steatite Corporation*, to become Vice-President of *Northwestern Terra Cotta Corporation*, will serve *U. S. Stoneware* as consulting ceramic engineer, according to an announcement by *Howard Farkas*, Vice-President of U. S. Stoneware.

Mr. Frahme is a graduate of Rutgers University with a degree of Bachelor of Science in Ceramics. He is a member of American Ceramic Society, New Jersey Ceramic Association and Phi Lambda Upsilon, honorary chemical fraternity.

Zialite

Reg. U. S. Pat. Off.

FOR NICKEL PLATING

The one bath especially designed for plating diecastings made of WHITE METAL ALLOYS including ZINC, LEAD, and ALUMINUM.

USE

Zialite

ADDITION AGENTS

for

HARD CHROMIUM BATHS

Finer-grained deposits.
Increased throwing power.
Less sensitivity to sulfate content.

ZIALITE CORPORATION

92 Grove Street, Worcester 5, Mass.

For Sale

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Slightly Used

BUFFS

LOOSE & SEWED
ANY QUANTITY
ALL SIZES

•

Michigan Buff Co., Inc.

4054 BEAUFAIT AVE.
DETROIT (7) MICHIGAN

Temperature Controller—Low Maintenance Unit

For controlling ovens, stills, baths, presses and coolants, the "*Electromax*", manifactured by *Leeds & Northrup Company*, 4934 Stenton Avenue, Philadelphia 44, Pa., fills the need for an inexpensive temperature controller of high sensitivity and needing practically no attention.

Designed for non-recording applications, it signals and controls only, although temperature readings may be taken manually with it at any time.

It consists of a Wheatstone bridge circuit with a vacuum-tube amplifier as the detector. Vacuum tubes used are standard types, requiring no special selection. It is completely a-c operated, needs no dry batteries or standard cells, and the lack of indicating or recording mechanism makes it a practically "zero maintenance" device.

Temperature sensitive elements used are "Thermohms", the manufacturer's resistance thermometer bulbs. Length of lead-wires does not affect calibration and the location of the bulbs can be changed as desired.

The case is 11 9/16 inches x 11 1/16 inches x 9 1/16 inches and can be mounted wherever convenient. Standard ranges are 0 to 250° F and 0 to 1000° F or the corresponding C ranges.

•

Metallizing

A fourth edition (Form 175C) of the Metco "*Metallizing Handbook*", contains all the material of the original book plus many pages on new, improved methods and constitutes a complete, authoritative, practical treatise on metallizing. As such it should prove invaluable to engineers and metallizing operators. Illustrated. Price, $2.00. Send check or cash with order to publisher only. Published by *Metallizing Engineering Company, Inc.*, 38–14 30th Street, Long Island City 1, N. Y.

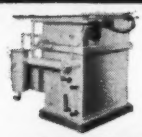
•

B. F. Goodrich Company Appoints R. B. Wetsel Anode Sales Manager

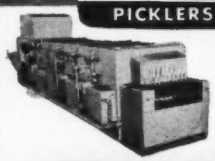
Robert B. Wetsel has been appointed Manager of Anode Sales of *The B. F. Goodrich Company*, it was announced by *E. F. Tomlinson*, General Manager, Industrial Products Sales division.

Wetsel will handle sale of all industrial products made directly from rubber latex by the Anode process.

For
DEGREASING • WASHING • RINSING
PICKLING and DRYING of METAL PARTS



DEGREASERS

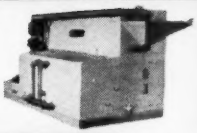


PICKLERS

Standard and Special Types of equipment from the smallest to the largest sizes for a wide variety of metal degreasing, washing, cleaning, rinsing, pickling, drying and allied operations.

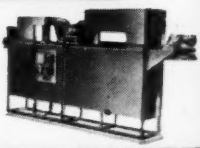
Send for illustrated bulletin

OPTIMUS EQUIPMENT CO.
ENGINEERS AND MANUFACTURERS
13 WATER STREET, MATAWAN, N. J.

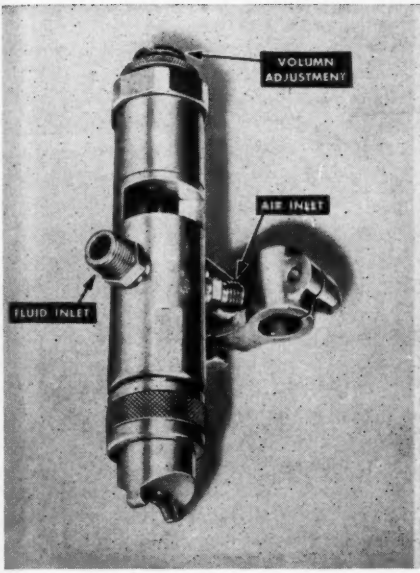


WASHERS

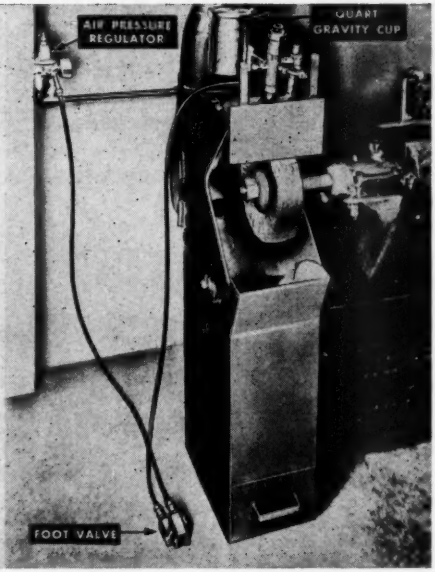
DRYERS



OPTIMUS EQUIPMENT
FOR CLEANING · RINSING · DEGREASING · PICKLING AND DRYING OF METAL PARTS



Set-up of new spray gun, completely detailed in a new book now available—"The Siefen Method of Spraying, Buffing and Polishing Compounds"



New air-operated spray gun, manufactured by the J. J. Siefen Company of Detroit, designed especially for spraying liquid compounds on buffing wheels

PQ SILICATES • PQ SILICATES • PQ SILICATES • PQ SILICATES

PQ SOLUBLE SILICATES

Popular among the basic alkalies that are used in metal cleaning compounds are the soluble silicates. PQ is headquarters for these soluble silicates:

Metso Granular Sodium Metasilicate ($Na_2SiO_3 \cdot 5H_2O$)
Metso 99 Sodium Sesquisilicate ($Na_2HSiO_4 \cdot 5H_2O$)
"G"—Hydrated powdered silicate "trisilicate" ($Na_2O \cdot 3.22\ SiO_2$)
"GC"—Hydrated alkaline sodium silicate ($Na_2O \cdot 2SiO_2$)
"SS-C Pwd."—Anhydrous powdered silicate ($Na_2O \cdot 2SiO_2$)

Write us for free descriptive bulletins, No. 172, 41-1, 41-8.

PHILADELPHIA QUARTZ COMPANY
ESTABLISHED 1831
PHILADELPHIA 6

PQ SILICATES • PQ SILICATES • PQ SILICATES • PQ SILICATES

WE

are only 58 miles from the Detroit Convention. . . .

Why not stop on your way home from the Convention and inspect our stock of new and used Polishing and Plating Equipment. Over 75 items in stock, including Automatic Buffing Equipment.

MITCHELL EQUIPMENT CORPORATION

Telephone: 269 5511 South Main Street, Sylvania, Ohio

There's No Substitute for Quality and Uniformity

HARRISON 4-A PRODUCTS

Superior Buffing and Polishing Compounds
To meet all your requirements

Consult us on your special needs.
We will send samples to meet them.

New Compounds for Spraying or Dipping

HARRISON & COMPANY, INC.

Haverhill, Massachusetts

"Karbate" Seven Tube Heat Exchanger

Seven tube "*Karbate*" *Impervious Graphite* shell and tube heat exchangers for use under highly corrosive conditions are now available from *National Carbon Company, Inc.*, 30 E. 42nd Street, New York 17, N. Y., in three standard sizes of 4′3″, 7′3″ and 10′3″ length. All three units employ 1″ I. D. x 1½″ O. D. "Karbate" tubes in bundles encased in standard 6″ I. D. steel pipe shells. The exchangers are identical in every respect except for pipe length and the number of "Karbate" baffles, and all tube bundles and shells of the same size are interchangeable.

The units can be employed as heaters, coolers, boilers or condensers, and can be operated vertically or horizontally. They will carry temperatures up to 338° F (170° C) and a working pressure of 50 lbs./sq. in. on both the tube and shell sides. Standard nozzle connections permit ready installation with piping connections of almost any material of construction. Water, brine or steam are suitable on the shell side.

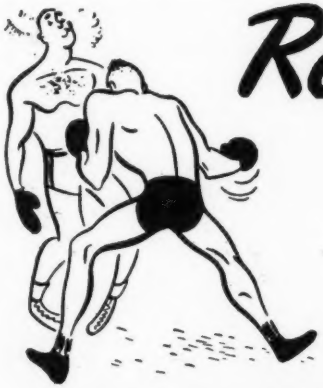
Write for Catalogue Section M8808.

New Melting and Dipping Equipment

For use in heating, melting, dipping and pouring critical compounds such as wax, paraffin, oils, fats, pitch, hydroline, battery, transformer, resistor, and capacitor compounds, two new groups of indirectly heated, fully insulated, thermostatically controlled melting tanks have just been developed by *Aeroil Products Company*, 5701 Park Avenue, West New York, N. J.

These new tanks are built on the double boiler principle to insure complete uniformity of accurately controlled temperature on all four sides and bottom of the inner vat that contains the materials to be melted. Built-in thermostatic controls hold temperature rigidly at any desired point from 100° to 550° F in fully insulated units that are cooled to the touch.

Both gas-fired and electrically heated equipment are available. Free illustrated *Leaflet No. 581*, with complete details of specifications, is available upon request to the manufacturer.



Ready for the Finishing Touch!

...METAL PARTS ARE MORE EASILY FINISHED WHEN CLEANED IN A

BLAKESLEE

METAL PARTS WASHER

G. S. BLAKESLEE & CO.

BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS · New York, N. Y. · Toronto, Ont.

Blast Cleaning Unit Has Return System

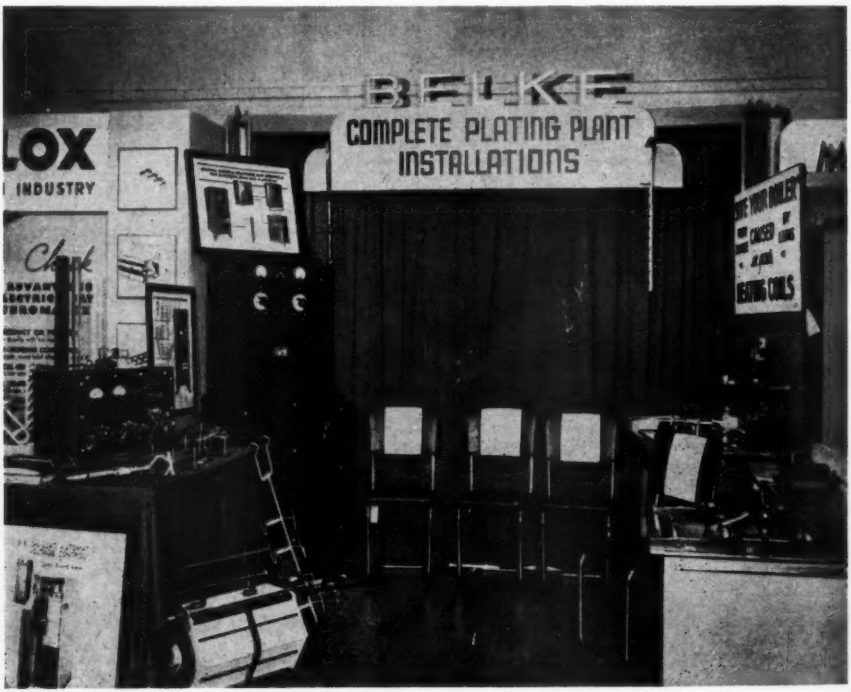
A unique feature of the "*Vacu-Blaster*", an entirely new Blast Cleaning Device, is its vacuum return system which permits no abrasives or other particles to escape into the open, and which makes possible blast cleaning under conditions formerly regarded as prohibiting the use of this means of removing corrosion, paint, stains, and other deposits.

Operated much as a household vacuum cleaner, the unit may be used without special precautions or preparations. No masks, goggles, or protective clothing are needed; there need be no interruption of other operations in the immediate area, and the pick-up system is so positive that precision machinery and other objects need not be covered or removed although adjacent to the operating unit.

Many types of abrasives may be used, depending upon the work to be done and the finish desired. Spent abrasive is reclaimed and reused as long as it remains effective.

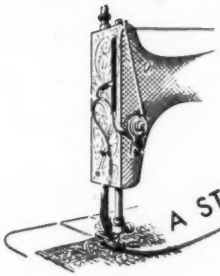
Operation is predominantly automatic. The blast is controlled by a switch at the gun through which the abrasive blast is directed and through which grit and dust are picked up. The system operates continuously returning grit and refuse to the reclaiming tank where grit returns to the blasting system and refuse is shunted to a dust collector.

The manufacturer is *Vacu-Blast Company, Inc.*, 1054 Broadway, Burlingame, Calif.



BELKE MANUFACTURING COMPANY DISPLAY AT THE CHICAGO PRODUCTION SHOW

Solu-Bridge Controllers, Insulated Plating Racks, Plating Barrels, Rheostats, General Electric Rectifiers, Chandeysson Generators, Permanent Tank Magnets, etc., were on display



A STITCH IN TIME

CUTS STRIPPING TIME FOR A

Sewing Machine Manufacturer

Recently, a leading manufacturer of sewing machines found a better, faster, more economical way to strip paint from sewing machine parts—thanks to modern Pennsalt methods.

TIME REDUCED TO ONE-SIXTEENTH

Formerly, they had used a caustic potash type of stripper . . . and the job took 24 hours.

The Pennsalt representative recommended and demonstrated a Pennsalt stripper. Result? Complete stripping in only 1½ hours . . . at less than half the previous cleaner cost!

WANT FULL DETAILS ON THIS CASE?

If you'd like to know more about this case, write us for Case Report Number 66-6, which gives complete details. If you have a tough problem in metal cleaning, plating, enamelling or corrosion-resistant construction, turn it over to your Pennsalt representative—by training and experience, he is thoroughly qualified to assist you.

PENN SALT

CHEMICALS

97 Years of Service to Industry

PENNSYLVANIA SALT MANUFACTURING COMPANY

Special Chemicals Division • 1000 Widener Building, Philadelphia 7, Pa.

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • WYANDOTTE • TACOMA • PORTLAND, ORE.

"YANKEE BRAND"

PROGRESSIVELY BETTER
ABRASIVE COMPOUNDS

Tailored to fit all
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Inquiries respectfully solicited

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PLATING and METAL FINISHING

Chromium . Udylite Cadmium . Electro Tinning . Zinc . Copper . Nickel
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Manufacturers of

SHERARDIZING EQUIPMENT
CIRCULAR & STRAIGHT MANDRELS
CALENDAR STOCK SHELLS . SPECIAL MACHINERY for the rubber industry

PHONES 2-3565 or 2-9828

THE

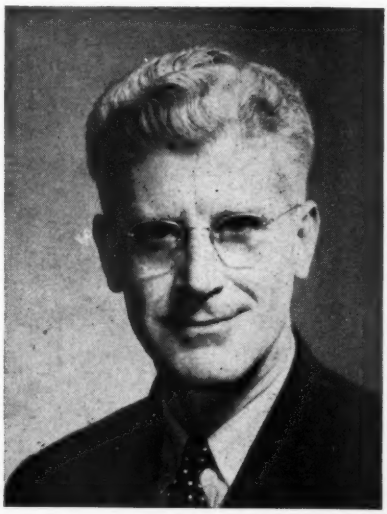
NATIONAL SHERARDIZING AND MACHINE CO.

868 Windsor St. Hartford, Conn.

Established 1910

Cowles Detergents Company Appoints Fulton

The Cowles Detergent Company, Cleveland, Ohio announces the appointment of *Harold F. Fulton*, better known as "Had" Fulton, as Cowles Technical Man in the New York State territory to handle sales and service work for the Metal Cleaner Department.



Mr. Fulton is a graduate of Miami University. He has had a wide experience in the metal working industries and during the war was employed by Allegheny Ludlum Steel Corporation at its Dunkirk, N. Y., plant.

He is well qualified by education and plant experience to give valuable assistance to the industrial concerns in New York State.

●

Conant Appointed by Optimus Detergents

Optimus Detergents Company, 120 Main Street, Matawan, N. J., manufacturers of industrial cleaning materials announces the appointment of *M. Paul Conant*, of Paterson, N. J., as field service representative. He will cover Hudson, Bergen, Passaic and Morris Counties in New Jersey.

Mr. Conant has had a wide experience in the subject of industrial cleaning, having formerly represented Turco Products, Inc. More recently, he was with Bendix, Inc.

L. M. Morley Is Elected Honeywell Vice-President

L. M. Morley has been elected a Vice-President of the *Minneapolis-Honeywell Regulator Company, Harold W. Sweatt,* President, has announced.

Mr. Morley, Vice-President in Charge of Sales for the *Brown Instrument Company,* a wholly-owned Honeywell subsidiary at Philadelphia, will continue to supervise sales of the industrial control devices made by the Brown division. His newest promotion thus makes him an officer of the parent company as well as its subsidiary, Mr. Sweatt said.

A graduate of the University of Pennsylvania, Mr. Morley joined the Brown Instrument Company in 1919 as a salesman. He was made Sales Manager in 1934 and became a Vice-President in 1935 when Brown and Minneapolis-Honeywell were merged to form the present corporation. He served in this capacity until his latest promotion.

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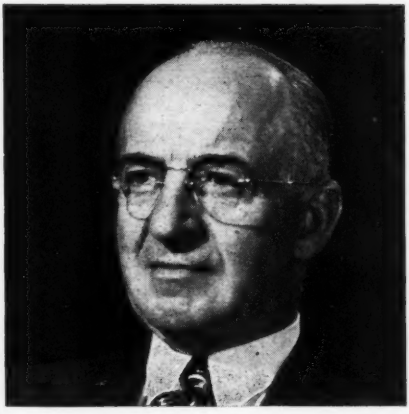

Henry J. Lucey To Handle Detrex Export Sales

Foreign correspondence and export sales of *Detrex Corporation* have been placed in the hands of *Henry J. Lucey,* Sales Manager of the Oil-Extraction Division, it was announced by *A. O. Thalacker,* Vice-President and General Manager.

His additional duties will place Mr. Lucey in complete charge of following up foreign

Hammond of KALAMAZOO
FINISHING PRODUCTION REACHES A NEW PEAK
HAMMOND
BACKSTANDS
CONVERT GRINDERS and POLISHERS into high production
ABRASIVE BELT UNITS
MODEL No. 3
Above: "VRO" Polishing Lathe with two No. 3 Backstands.
WRITE FOR CATALOG NO. 55
—covering complete line of Hammond equipment.
Hammond Machinery Builders
1613 DOUGLAS AVENUE, KALAMAZOO 54, MICH.

RECtifier with conTROL
Selenium Plating Rectifiers
No. 102
Rectrol rectifiers embody every feature essential for dependable continuous operation. Rectrol is a completely self contained rectifier with stepless variable controls, meters, switches, etc.
They're available in a wide selection of units from small experimental sizes to factory production models.
Standard and Custom Built Units by Rectifier Engineers
Electro-Tech Equipment Company
119 Lafayette St. New York 13, N. Y.

Headquarters

for

Buffs—Cleaners
Buffing Compositions
Nickel Anodes
Chemicals
General Supplies
Equipment

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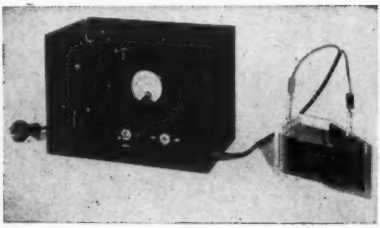
JACOB HAY CO.

(NOT INC.)

4014 WEST PARKER AVENUE
CHICAGO, ILL.

★ **SEE** THE NEW
LUCITE HULL CELL
WITH RECTIFIER UNIT
. . . at the Convention!



(Headquarters at the Hotel Statler)

R. O. HULL & CO., INC.

1277 West Third St.
Cleveland 13, Ohio

inquiries and sales in all of the company's three major divisions: industrial metal cleaning, drycleaning and oil-extraction. He will work under *W. W. Davidson*, Vice-President in Charge of Sales and Advertising.

Lucey came to Detrex in July, 1944, from Washington where he was with the W. P. B. in charge of allocating chlorinated solvents. He received his Bachelor of Science degree in Chemical Engineering from the Massachusetts Institute of Technology. At one time, he was Vice-President of Curtin-Howe Corporation, a subsidiary of Westvaco Chlorine Products Corporation. Mr. Lucey is a member of the American Society of Oil Chemists.

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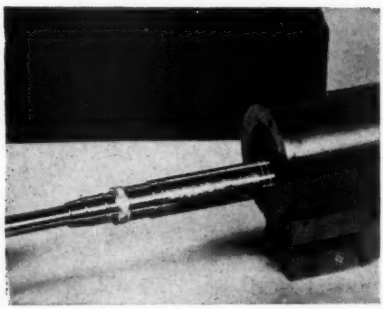

New Profilometer Accessory

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The Type LA Tracer is mechanically operated by means of a Mototrace and Type BA Linkarm. By using Linkarms of the proper length for each application, measurements can be taken with the one tracer at various depths to 36" or greater.

An illustrated bulletin giving full details is available on request from Physicists Research Company, 321 S. Main Street, Ann Arbor, Mich.

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Out of some cold figures, came a story to warm America's heart

NOT LONG AGO, the Secretary of the United States Treasury studied a figure-covered sheet of paper.

The figures revealed a steady, powerful upswing in the sale of U. S. Savings Bonds, and an equally steady decrease in Bond redemptions.

But to the Secretary, they revealed a good deal more than that, and Mr. Snyder spoke his mind:

"After the Victory Loan, sales of U. S. Savings Bonds went down—redemptions went up. And that was only natural and human.

"It was natural and human—but it was also dangerous. For suppose this trend had continued. Suppose that, in this period of reconversion, some 80 million Americans had decided not only to stop saving, but to spend the $40 billion which they had *already* put aside in Series E, F & G Savings Bonds. The picture which *that* conjures up is not a pretty one!

"But the trend did NOT continue.

"Early last fall, the magazines of this country—nearly a thousand of them, acting together—started an advertising campaign on Bonds. This, added to the continuing support of other media and advertisers, gave the American people the facts . . . told them why it was important to buy and hold U. S. Savings Bonds.

"The figures on this sheet tell how the American people responded—and mighty good reading it makes.

"Once more, it has been clearly proved that when you give Americans the facts, you can then ask them for action—and *you'll get it!*"

What do the figures show?

On Mr. Snyder's sheet were some very interesting figures.

They showed that sales of Savings Bonds went from $494 million in last September to $519 million in October and kept climbing steadily until, in January of this year, they reached a new post-war high:

In January, 1947, Americans put nearly a billion dollars in Savings Bonds. And that trend is continuing.

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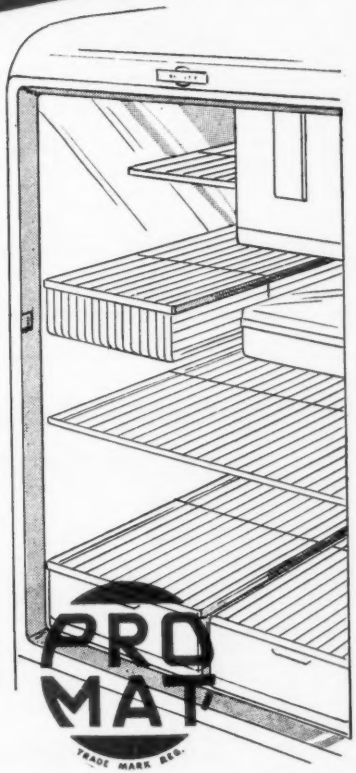

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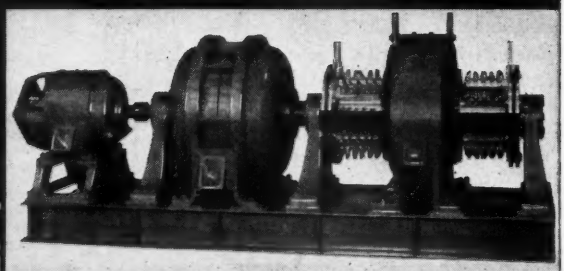

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BRANCH	Membership May 1, 1946	New Members	Net Change in Membership	Per Cent Net Change
FIRST GROUP				
PHILADELPHIA	170	55	+47½	+28.0
NEW YORK	201	65	+56	+27.8
BRIDGEPORT	124	30	+23	+18.5
CHICAGO	359	71	+51½	+14.3
TORONTO	131	19	+13	+ 9.9
CLEVELAND	177	37	+16	+ 9.0
WATERBURY	128	14	+10½	+ 8.2
LOS ANGELES	181	34	+12½	+ 6.9
NEWARK	243	32	+14½	+ 6.0
HARTFORD	134	23	+ 7	+ 5.2
DETROIT	440	64	− 9½	− 2.2
BOSTON	168	17	− 8	− 4.8
SECOND GROUP				
PITTSBURGH	97	30	+28½	+29.4
GRAND RAPIDS	116	20	+20	+17.2
INDIANAPOLIS	90	10	+12	+13.3
BUFFALO	87	12	+11	+12.6
BALTIMORE–WASH.	114	11	+ 6	+ 5.3
NEW HAVEN	110	11	+ 5	+ 4.5
MILWAUKEE	120	15	+ 4½	+ 3.7
DAYTON	87	11	+ 2½	+ 2.9
PROV.–ATTLEBORO	122	16	+ 3	+ 2.5
ROCHESTER	97	4	− 7½	− 7.7
SPRINGFIELD	82	9	− 8	− 9.8
ST. LOUIS	122	18	−26	−21.3
SYDNEY	82	11	−22	−26.8
JACKSON-LANSING	85	4	−35½	−41.7
THIRD GROUP				
ST. JOSEPH VALLEY	60	19	+24	+40.0
TWIN CITY	72	28	+23½	+32.6
ADELAIDE	37	12	+12	+32.5
ROCKFORD	53	9	+11	+20.8
SAN FRANCISCO	64	21	+12½	+19.5
SYRACUSE	64	15	+ 9½	+14.8
MELBOURNE	59	..	+ 1	+ 1.7
COLUMBUS	34	5	.....	.....
LANCASTER	38	1	.....	.....
MONTREAL	61	8	− 1½	− 2.5
CINCINNATI	58	3	− 4	− 6.9
TOLEDO	60	2	− 4½	− 7.5
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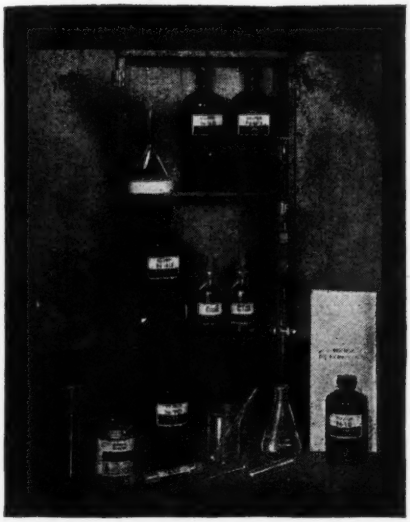

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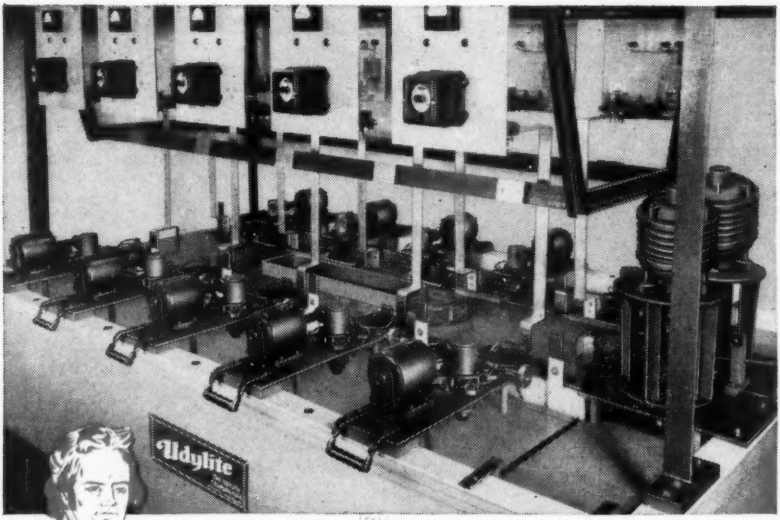

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